

XV. THE SERRASALMINÆ AND MYLINÆ.¹

BY C. H. EIGENMANN.

(PLATES XLIV-LVIII.)

The Serrasalminæ and the Mylinæ are highly specialized fresh-water fishes. They are members of the family of the Characidae, ubiquitous in South America, being rather closely allied to the Tetragonopterinae and the Bryconinae. They are compressed, deep fishes, with a series of median spines along a greater or less part of the ventral surface. The dorsal fin is longer than in most of the other South American characins, and reaches its maximum length in *Myleus pacu*, which has twenty-seven dorsal rays. The anal fin is long and its base is usually inclined far from the horizontal. The predorsal line is naked. The adipose fin is well-developed, and in *Piaractus* of the Mylinæ and in *Pygocentrus* of the Serrasalminæ it is rayed. The mouth and teeth in all cases are highly differentiated and specialized. The number of teeth for the various species is fixed, or in some cases varies one or two teeth on each side of each jaw.

The teeth in fishes are usually small, conical, and arranged in bands. Compared with other fishes have the teeth restricted in number and with individual characteristics. In the Mylinæ and the Serrasalminæ the teeth are few in number and for the most part so specialized, that it would be possible, in some cases at least, to determine the location in the jaw of any individual tooth. But the dentition in related species, tooth for tooth, is often so similar that it is practically impossible to determine from which of several related species it may have come. The form of the teeth in different genera varies from molars, as in some species of Mylinæ, to incisors, which may be bicuspid, tricuspid, or multicuspid. The Serrasalminæ contain a single series of teeth in each jaw and sometimes a series on the palatines. The palatine teeth vary much more in number than the teeth of the jaws. The teeth in *Pygopristis denticulatus* of the Serrasalminæ are nearly bilaterally symmetric, with

¹ Contribution from the Zoölogical Laboratory of Indiana University, No. 142.

two small graduate cusps on each side of the large median cusp. In the other genera the teeth of one or both jaws are asymmetric, the cutting edge of one side longer than on the other, and the cusps, if present, not bilaterally symmetric.

In the species of Serrasalminæ, aside from *Pygopristis*, there is a complete gradation from slender, sharp-snouted, narrow-headed species with highly developed teeth on the palate, like *Serrasalmo elongatus*, to deeper, broad-headed, bull-dog-nosed species with the palatine teeth indifferently developed, or, in some species absent (*Pygocentrus piraya*, *Rooseveltiella nattereri*, etc.). One of the broad-headed species has the adipose fin rayed, and has been separated as representing a distinct genus, *Pygocentrus*.

All of the species of the Serrasalminæ have an evil reputation as carnivores. Those with a short upper jaw, heavy lower jaw, broad interorbital, and no palatine dentition, and which are known as peri, pirays, or piranhas (species of *Pygocentrus* and *Rooseveltiella*) are undoubtedly the worst. Stories of their depredations, from cutting the leaders of fish-lines, cutting up fish-nets, mutilating other fishes, taking off fingers or toes, or otherwise mutilating man or beast, to skeletonizing a horse and rider, who tried crossing a stream where they abound, are found in many books of travel, from that of Fray Pedro Simon in 1535 to that of Colonel Theodore Roosevelt in 1914. Credulity and "fear of the unseen terror" have undoubtedly exaggerated the real conditions, but it is certain that in some regions where they are excessively numerous they are a great nuisance. Mr. Anisits, who collected fishes for me in the upper Paraguay, reported that at one point he did not succeed in doing much, because the piranhas cut up the nets to such an extent that it required hours to patch them after every cast, and it was dangerous to life to enter the water.

Humboldt in his *Observations, Zoologie*, II, 1809, p. 174, quotes from two old sources as follows:

"Llevaron algunos de los soldados de Herera (mas arriba de Cabruta) unas calzas enteras de red con muy gruesos nudos, que se hallaron entre el demas pillaxe de aquella gente, que usaran dellas los Indios para entrar á pescar en las cienegas, con que se defendian de unos peces que los Españoles llamaron Caribes, por ser tan fieros y atrevidos que hacen en todo lo que topan dentro del agua: y assiendo destes nudos quando entraran los pescadores á pescar, quedaba libre

la carne de sus bocas."² Fray Pedro Simon, Nat. Hist. de la Conquista (1726), p. 224.

The missionary Gili also says in his naïve style:

"Il Caribito chiamasi così por lo strano amore que porta alle umane carni. I Caribiti son piatti, del peso di una libra e più grandi. In Auvana dove si prendono con carne salata, vi sono del peso di quattro libre. Chi volesse in breve scolpato bene un cadavere, basterebbe di metterlo por qualche ore nell' Orinoco. Tanti e si famelici gli affollerebbero intorno i Caribiti, qui otterebbe sicuramente l'intento."³—Saggio di Storia Americana, Tom. I, p. 78.

Humboldt in a foot-note states that "a young Parageni Indian, whose language appeared to me a dialect of Pareni, called the constellation of the southern cross 'Bahumedi': he added that this was the name of the fish Caribe which I had drawn."

Bancroft in his "Essay on the Natural History of Guiana," 1769, p. 189, says that the "Peri" "is extremely voracious, and bites everything which hangs in the water. The feet of ducks swimming in the creeks are frequently amputated, as have been the breasts of women, and the privities of men swimming in the rivers."

Spix (Selecta Genera et Species Piscium, 1829, p. 73) says of one species, probably the *Pygocentrus piraya*:

"Habitat in Brasiliæ æquatorialis fluviis, uti reliquæ species, voracissimus, omnibus animalibus aquatilibus infestissimus, edulis."

² I am indebted to my friend Prof. A. Kuersteiner for the translation of the Spanish.

³ Some of the Soldiers of Herera carried off (somewhere beyond Cabruta) some breeches made entirely of network with very big knots, which happened to be among the rest of the spoils from those people. The Indians made use of these to go fishing in the mud, and with them they defended themselves against some fishes which the Spaniards called Caribes, because they are so bold and ferocious that they attack everything they meet in the water, and as they take hold of these knots, when the fishermen go in to fish, the flesh is unharmed by their mouths.'

This originally appeared in an account of the voyage of Alonso de Herrera (1535) to the Rio Meta.

³ Translation of the Italian.

The Caribito is so-called because of its strange liking for human flesh. The Caribitos are flat, and weigh a pound and even more. In Auvana, where they are caught with salt meat, there are some that weigh four pounds. Whoever would like to get rid of a corpse in a short time would merely have to put it in the Orinoco for a few hours. So many and such hungry Caribitos would crowd around it, he would attain his end without fail.

Schomburgk, in his "Fishes of British Guiana," I, 1841, p. 225, says of the pirai of Guiana:

"This most voracious fish is found plentifully in all the rivers in Guiana, and is dreaded by every other inhabitant or visitant of the river. Their jaws are so strong that they are able to bite off a man's finger or toe. They attack fish of ten times their own weight, and devour all but the head. They begin at the caudal fin; and the fish being thus left without the principal organ of motion, is devoured with ease, several going to participate of the meal. Indeed, there is scarcely any animal which they will not attack, man not excepted. Large alligators, which have been wounded on the tail, afford them a fine chance of satisfying their hunger, and even the toes of this formidable animal are not free from their attacks. The feet of ducks and geese, which are kept in the neighborhood where they are plentiful, are almost invariably cut off, and young ones devoured altogether; and in these places it is not safe to bathe, or even to wash clothes in the river, many cases having occurred of fingers and toes having been cut off by them. . . .

"The pirai, or huma, by which name the fish just described is generally known to the aboriginal tribes of British Guiana, inhabits the rivers which intersect that fertile colony. They are not to be found within forty miles of the coast, nor are they plentiful at the upper part of the rivers. Their favourite haunt appears to be those parts of the rivers which are between a hundred and a hundred and fifty miles from the coast, chiefly if there be large blocks of rock, about which they hover to procure themselves worms, etc. The ovary in the female is double. They deposit their spawn in the currentless inlets which form so peculiar a feature in the rivers of Guiana; this occurs during the months of January and February, at which period we found the females generally destitute of roe.

"While we ascended the river Cabalaba, a tributary of the Corentyn, from the east, we observed a river-cavia (*Hydrocharus capybara*) with five young ones, out of which number three were captured; and all were deficient in their toes, they having been bitten off by the pirais.

"Whilst we were continuing our course on the river Corentyn, one morning an object was observed to drift into the middle of the stream, around which there appeared to be a great commotion. The telescope did not assist us in coming to a conclusion what it might be;

and though we were in-shore, stemming a strong current, I ordered the corial to paddle for it. When we came near, we observed the head of a large luganani or sun-fish (*Cychla ocellaris*), which was surrounded by numerous pirais tearing off large parts of its flesh. We secured the luganani, which might have measured from twenty to twenty-six inches, and though the poor animal had been eaten off piecemeal to within its pectoral fins, it was still alive. Being deprived of its tail and lower fins, it drifted perpendicular. The corial was brought to, our hooks and lines were soon out, and we caught several of the depredators, which with the remnant of the luganani, afforded us a good breakfast.

"The ducks and geese are equally exposed to the attacks of the pirai, and those which the settlers keep near the banks of the river are generally deprived of the lower part of their feet. It is a strange sight to see them walking on mere stumps. In Wicki, a wood-cutting establishment at the river Berbice, there were two *vicissi ducks* (*Dendrocygna viduata*) which had been perfectly tamed by the Indians, and were brought from the large ponds in the interior. Unacquainted with the danger which the ravenous pirai offered them, their instinct directed them to their favourite element, and one of them paid for its first visit with the loss of its toes, and the other was similarly injured in its future visits. They now became cautious, and it was remarkable to observe how studiously they kept in-shore, and never trusted themselves beyond their depth.

"The pirai is from nature a tyrant, and connects with it the greatest voraciousness. I am almost persuaded that it surpasses the ravenous pike, though the latter, *par excellence*, is called the tyrant of the watery plain! They are caught with hook and line, and their greediness is so great, that no art is necessary to conceal the bait. The hook may be baited with a piece of fish, bird, or animal, or merely their entrails; the pirai will dart at it the instant it is thrown into the water, and seize it with eagerness; but it frequently happens that, with its sharp teeth, it bites the line and escapes with the hook in its mouth. We therefore surrounded the line, where it was fixed to the hook, the length of two or three inches, with tin or lead, and though it had a clumsy appearance, we were not less successful. Some precaution is necessary, even after the fish has been lifted out of the water, or it will inflict, in its struggles, serious wounds; the angler has therefore a small bludgeon ready, wherewith its skull is broken."

Roosevelt, in the account of his recent travels, tells of the voracity and depredations of the piranhas of the Paraguay. He says of *Rooseveltiella nattereri*:

At Concepcion . . . "We caught many fish.

"They belonged to one of the most formidable genera of fish in the world, the piranha or cannibal fish, the fish that eats men when it can get the chance. Farther north there are species of small piranha that go in schools. At this point on the Paraguay the piranha do not seem to go in regular schools, but they swarm in all the waters and attain a length of 18 inches or over. They are the most ferocious fish in the world. Even the most formidable fish, the sharks, or the barracudas, usually attack things smaller than themselves. But the piranhas habitually attack things much larger than themselves. They will snap a finger off a hand incautiously trailed in the water; they mutilate swimmers—in every river town in Paraguay there are men who have been thus mutilated; they will rend and devour alive any wounded man or beast; for blood in the water excites them to madness. They will tear wounded wild fowl to pieces; and bite off the tails of big fish as they grow exhausted when fighting after being hooked. Miller, before I reached Asuncion, had been badly bitten by one. Those that we caught sometimes bit through the hooks, or the double strands of copper wire that served as leaders, and got away. Those that we hauled on deck lived for many minutes.

"Most predatory fish are long and slim, like the alligator and pickerel. But the piranha is a short, deep-bodied fish, with a blunt face and a heavily undershot or projecting lower jaw which gapes widely. The razor-edged teeth are wedge-shaped like a shark's, and the jaw muscles possess great power. The rabid, furious snaps drive the teeth through flesh and bone. The head with its short muzzle, staring malignant eyes, and gaping, cruelly armed jaws, is the embodiment of evil ferocity; and the actions of the fish exactly match its looks.

"I never witnessed an exhibition of such impotent, savage fury as was shown by the piranhas as they flapped on deck. When fresh from the water and thrown on the boards they uttered an extraordinary squealing sound. As they flapped about they hit with vicious eagerness at whatever presented itself. One of them flapped into a cloth and seized it with a bulldog grip. Another grasped one of its fellows; another snapped at a piece of wood, and left the teeth-

marks deep therein. They are the pests of the waters, and it is necessary to be exceedingly cautious about either swimming or wading where they are found. If cattle are driven into, or of their own accord enter, the water they are commonly not molested; but if by chance some unusually big or ferocious specimen of these fearsome fishes does bite an animal—taking off an ear, or perhaps a teat from the udder of a cow—the blood brings up every member of the ravenous throng which is anywhere near, and unless the attacked animal can immediately make its escape from the water it is devoured alive. Here on the Paraguay the natives hold them in much respect, whereas the caymans are not feared at all. The only redeeming feature about them is that they are themselves fairly good to eat, although with too many bones. . . .

“I happened to mention that one of our naturalists, Miller, had been bitten by a piranha, and the man-eating fish at once became the subject of conversation. Curiously enough, one of the Brazilian taxidermists had also just been severely bitten by a piranha.

“My new companions had story after story to tell of them. Only three weeks previously a twelve-year-old boy, who had gone in swimming near Corumba, was attacked, and literally devoured alive by them. Colonel Rondon during his exploring trips had met with more than one unpleasant experience in connection with them. He had lost one of his toes by the bite of a piranha. He was about to bathe and had chosen a shallow pool at the edge of the river, which he carefully inspected until he was satisfied that none of the man-eating fish was in it; yet as soon as he put his foot into the water one of them attacked him and bit off a toe.

“On another occasion while wading across a narrow stream one of his party was attacked; the fish bit him on the thighs and buttocks, and when he put down his hands tore them also; he was near the bank and by a rush reached it and swung himself out of the water by means of an overhanging limb of a tree; but he was terribly injured, and it took six months before his wounds healed and he recovered.

“An extraordinary incident occurred on another trip. The party were without food and very hungry. On reaching a stream they dynamited it, and waded in to seize the stunned fish as they floated on the surface. One man, having his hands full, tried to hold one fish by putting its head into his mouth; it was a piranha and seemingly stunned, but in a moment it recovered and bit a big section out of

his tongue. Such a hemorrhage followed that his life was saved with the utmost difficulty.

"On another occasion a member of the party, a brother of the Lieutenant Barbosa who was with us, was off by himself on a mule. The mule came into camp alone. Following his back track, they came to a ford, where in the water they found the skeleton of the dead man, his clothes uninjured, but every particle of flesh stripped from his bones. Whether he had drowned, and the fishes had then eaten his body, or whether they had killed him it was impossible to say. They had not hurt the clothes, getting in under them, which made it seem likely that there had been no struggle.

"These man-eating fish are a veritable scourge in the waters they frequent. But it must not be understood by this that the piranhas—or, for the matter of that, the new-world caymans and crocodiles—ever become such dreaded foes of man as for instance the man-eating crocodiles of Africa. Accidents occur, and there are certain places where swimming and bathing are dangerous; but in most places the people swim freely, although they are usually careful to find spots they believe safe or else to keep together and make a splashing in the water." (Extracted from a letter published in various daily papers, 1914.)

John D. Haseman, on the labels accompanying specimens collected for the Carnegie Museum, states that one of the specimens of *Pygocentrus piraya* from the Rio San Francisco, had bitten him on the thumb, and that another specimen of *Rooseveltiella nattereri* nearly severed one of his fingers. I dragged nets, and otherwise caught many pirayas in Guiana, in a region where they are reported as being very bad, without any mishap either to myself or to any of my assistants, but I lost numerous hooks, which were neatly severed by the saw-teeth of some species of piraya.

The Mylinæ have two series of teeth in the front of the upper jaw and mostly use vegetable food. Some of them browse on the vegetation on the rocks, especially about rapids, and have the front teeth developed as incisors; *Myloplus micans* is one of these. Others have molars developed, and feed in large part on fruits, which drop into the rivers.

Different species of the Mylinæ vary from small, thin, pompano-shaped fishes, with prolonged dorsal and anal fins and a weight, when full sized, of a few ounces, to large, heavy species, shaped like the

marine sunfish, *Mola*, reaching many pounds in weight. The "pacu" is the most famous, and is one of the principal food-fishes of the Indians of Guiana. *Myleus pacu* reaches a length of two feet and a weight of ten pounds.

Many of the characins have a black spot at the end of the caudal peduncle extending to and partly covering the base of the caudal. The Serrasalminæ and Mylinæ have this spot, which develops normally in the young, but becomes modified with age. The portion on the caudal peduncle fades and the caudal portion sends out arms along the outer part of the caudal lobes, so that the spot becomes <-shaped. The rest of the caudal may remain clear of markings, although there may be a distinct increase in pigmentation with age. In other species chromatophores accumulate either along the margin of the fin, or they may form a band at some distance within the margin. A shoulder-spot is also found in very many species of characins. Usually it lies above the lateral line and at some distance from its origin. It may consist of a general concentration of chromatophores from neighboring regions, which in consequence are left free from chromatophores, or the spot may take on a definite form characteristic of the species. The development of this definite form is probably a secondary manifestation. The cause of the primary congregation of chromatophores on the shoulder may either be due to positive chemotaxis causing the migration of the chromatophores to a definite point, or to negative chemotaxis causing them to migrate away from certain regions. I have been inclined to attribute it to positive chemotaxis, which causes the chromatophores to aggregate over or near a pseudotympanum over the anterior air-bladder. A triangular area of the sides over the first air-bladder is free from muscles in the young, the skin and peritoneum forming the only covering of the body-cavity. The spot forms near this delicate membrane. But the fact, that there is frequently an accumulation of pigment-cells behind the unpigmented area surrounding the spot, is strong evidence that the migration of the cells is at least in part due to negative taxis.

In the Serrasalminæ and Mylinæ the shoulder-spot, if developed, is diffuse, and lies just back of the opercular margin at the origin of the lateral line. It varies very greatly in different species, and even in the same species it may be totally absent or well-developed.

Small circular spots on the upper half of the sides, or over the entire

body, are very frequently developed in the Serrasalminæ and Mylinæ. These are as characteristic as the spots on the young of thrushes (*Turdidæ*). These spots begin to appear when the young have reached a length of between one and two inches. They are probably most prominent when the fish is between four and eight inches long, and they become obscured or disappear entirely in old age. The juvenile color is different from the adult color in some other ways. In *Mylosoma ocellatus*, for instance, there are cross-bars and an ocellus on the sides, and in *Colosoma* there are cross-bars without an ocellus. As in other fishes, the obliteration of the juvenile markings is in part due to the development with advancing age of more superficially located pigment.

The Serrasalminæ and Mylinæ are for the most part lowland fishes. So far as recorded they reach the maximum elevation in the Rio das Velhas of the San Francisco basin. They are not found in the upper Potaro river, the Iguassú above the falls, nor in the Magdalena or elsewhere beyond the Andes, nor in the coastwise streams between the Rio Itapicurú and Rio Grande do Sul.

The Serrasalminæ can readily be distinguished from the Mylinæ by the teeth. The former have a single series of teeth in each jaw. The latter have two series of teeth in the premaxillary and frequently a pair of teeth behind the front series of the lower jaw.

The interneural, the upper end of which carries the predorsal spine, lies between the sixth and seventh neural spines. The vertebrae, counting on the radiographs as abdominal those from the first which carries a neural spine to the last which carries ribs, and as caudal all those behind these, number as follows:

<i>Pygopristis denticulatus</i>	14 + 20
<i>Serrasalmo rhombeus</i>	14 + 20
<i>Myleus ellipticus</i>	16 + 19
<i>Catoprion mento</i>	14 + 22
<i>Metynnix maculatus</i>	14 + 19

This count does not take into consideration the coalesced vertebrae immediately adjacent to the head.

Subfamily SERRASALMINÆ.

Compressed, deep; ventral surface with serræ; premaxillary and mandible each with a single series of notched or lobate teeth; palate sometimes with teeth; dorsal comparatively long; ventrals minute, anal variously developed; a procumbent predorsal spine.

I have been unable to assign a place to *Salmo undulatus* and *Serrasalmo scotopterus* of Schomburgk, *Fishes of British Guiana*, Vol. I, pp. 232 and 233. The former was taken in the Padauri and the latter in the Rio Branco, both of the Amazon basin.

KEY TO THE GENERA OF THE SERRASALMINÆ.

- a. Teeth symmetric, notched, or denticulate; no teeth on the palate; adipose fin not rayed, anal long, naked. *Pygopristis* Müller & Troschel. I.
- aa. Teeth oblique; asymmetric incisors, with a cusp on one or both sides near the base of the large median cusp; successive teeth interlocking so as to form a continuous serrate cutting edge.
 - b. Palatines smooth, without teeth; second suborbital covering all, or nearly all, of the cheek; snout short, mouth wide; margin of upper jaw very oblique; lower jaw very heavy, the teeth pointing backward and upward, larger than those of the upper jaw. Interorbital 2-2.25 in the head; depth 1.8-2 in the length.
 - c. Anal short, with fifteen rays, its origin below the space between dorsal and adipose; no teeth on the palate. *Gastropristis* gen. nov. II.
 - cc. Anal with twenty-three to thirty-eight rays; its origin below the dorsal.
 - d. Adipose fin rayed in the adult (normal in the young and half-grown). *Pygocentrus* Müller & Troschel. III.
 - dd. Adipose fin not rayed. *Rooseveltiella* gen. nov. IV.
 - bb. Palate rough, or with obsolescent teeth (see under *aureus*); second suborbital leaving a very wide naked area; margin of upper jaw not very oblique; interorbital 2.25; depth 1.4-1.8 in the length to the end of the lateral line. *Pristobrycon* gen. nov. V.
- bbb. A series of well-developed teeth on the palate; gape long, second suborbital leaving a variable naked area, or completely covering the cheek; upper jaw not very oblique. *Serrasalmo* Lacépède. VI.

I. Genus PYGOPRISTIS Müller & Troschel.

Pygopristis MÜLLER & TROSCHER, *Horæ Ichthyol.*, Vol. I, 1845, p. 21, tab. ix, figs. 2a and 2b (*fumarius*).

Type, *Pygopristis fumarius* Müller & Troschel, = *Serrasalmo denticulatus* Cuvier.

Characters of the Subfamily.—No teeth on the palate, those of both jaws serrate or lobed; anal naked.

Distribution.—Guiana to Paraguay.

KEY TO THE SPECIES OF PYGOPRISTIS.

- a. D. 19; A. 35; depth 1.66; head 4; snout obtuse, as long as eye; second suborbital reaching about half-way to the pre-opercle; about thirty to thirty-four abdominal serræ; adipose 3.5 in the dorsal. *denticulatus* (Cuvier). 1.
- aa. D. 16; A. 33; depth 1.66; adipose fin small; vertical fins with blackish margins. *serrulatus* Cuvier & Valenciennes. 2.

I. *Pygopristis denticulatus* (Cuvier).

Serrasalmo denticulatus CUVIER, Mem. Mus. Paris, Vol. V, 1819, p. 371; GÜNTHER, Cat. Fish. Brit. Mus., Vol. V, 1864, p. 367 (British Guiana).

Pygopristis denticulatus MÜLLER & TROSCHEL, Horæ Ichthyol., Vol. I, 1845, pp. 21 and 34, tab. ix, fig. 1 (Guiana); in SCHOMBURGK, Reisen, Vol. III, 1848, p. 637 (Essequibo; Takutu; Rupununi); CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 297 (Essequibo); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 59; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 296 (Lower Amazon); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 441; Mem. Carnegie Mus., Vol. V, 1912, p. 385 (Lama Stop-off).

Pygopristis fumarius MÜLLER & TROSCHEL, Horæ Ichthyol., Vol. I, 1845, pp. 21 and 35, tab. 9, fig. 2; SCHOMBURGK, Reisen, Vol. III, 1848, p. 637 (Rupununi; Essequibo); KNER, Characinen, Vol. II, 1859, p. 27 (Rio Branco).

? *Serrasalmo punctatus* SCHOMBURGK, Fishes Guiana, Vol. I, 1841, p. 223.

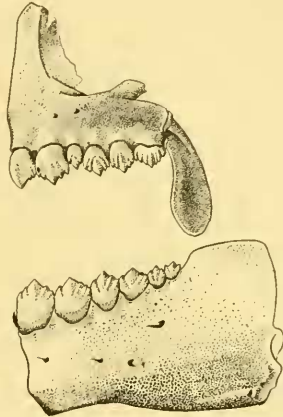


FIG. 1. Dentition of *Pygopristis denticulatus* (Cuvier). $\frac{2}{1}$.

Distribution.—Guianas to Amazon.

It is quite possible that Schomburgh's drawing represents *Pristobrycon scapularis* instead of this species.

2. *Pygopristis serrulatus* Cuvier & Valenciennes.

Pygopristis serrulatus CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 300 (Amazon); CASTELNAU, Anim. Amer. Sud, Poiss., 1855, pl. 38, fig. 3 (Araguay; Amazon); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus.; Vol. XIV, 1891, p. 59; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, p. 297 (Brazil); EIGENMANN, Reports Princeton Univ. Exp., Patagonia, Vol. III, 1910, p. 441. *Serrasalmo serrulatus* GÜNTHER, Cat. Fish. Brit. Mus., Vol. V, 1864, p. 367. BOULENGER, Trans. Zool. Soc. London, Vol. XIV, 1867, p. 37 (Paraguay); Boll. Mus. Univ., Torino, Vol. XII, 1897 (Mission de San Francisco).

Distribution.—Amazon; Matto Grosso; Paraguay.

The type of this species is about 150 mm. long.

II. Genus GASTROPRISTIS gen. nov.

Type, *Serrasalmo* (*Pygocentrus*) *ternetzi* Steindachner.

This genus is very similar to *Pygocentrus* from which it differs in the length of the anal. It is possible that the single specimen known, 150 mm. long, has met with some accident. If not, the species is certainly the type of a new genus.

Characters of *Pygocentrus*, but the origin of the anal on the vertical from a point midway between the dorsal and adipose fins. Adipose fin not rayed in the adult.

Range that of the single species.

3. *Gastropristis ternetzi* (Steindachner).

Serrasalmo (*Pygocentrus*) *ternetzi* STEINDACHNER, Anz. K. Acad. Wiss. Wien., 1908, p. 359 (Descalvados on the Paraguay).

Known only from the following description of Steindachner.

"Head 2.6; depth 1 $\frac{4}{7}$; D. II, 15; A. III, 12; scales 38 to 40-86 + 7-40 to 43; serræ in front of anus 27; eye 5 in the length of the head; interorbital 2.25; snout 2.33; base of anal 2.25; height of anal 2.33; base of dorsal 1.6; height of dorsal 2.25; length of pectoral 1.6; ventral 3; depth of caudal peduncle 2.75.

"Snout short, blunt; lower jaw heavy as in *piraya*; second suborbital leaving a narrow naked margin behind; origin of dorsal midway between snout and caudal, behind the vertical from the front of the ventrals; adipose fin about 6 in the length of the head; pectoral not reaching ventral; anal scaled at its base, its margin convex; last anal ray about half as high as the first divided ray. Upper half of body with obscure dark, round spots." (*Translation*.)

III. Genus PYGOCENTRUS Müller & Troschel.

Pygocentrus MÜLLER & TROSCHER, Horæ Ichthyol., Vol. I, 1845, p. 20.

Type, *Serrasalmo piraya* Cuvier.

Compressed, ventral surface with serræ from below the pectoral to the anal; teeth compressed asymmetric incisors, more or less notched, in a single series in each jaw. Palate without teeth; interorbital very broad, the snout short, sometimes appearing abnormally so, lower jaw short and very heavy; cheeks more or less completely armed by the suborbitals; adipose fin rayed in the adult (over 125 mm.); anal long, with over twenty-five rays, its origin below the dorsal.

Distribution.—Guiana, Amazons, Rio San Francisco, (and to Paraguay?).

As far as known this genus contains one species, the type. I am not sure whether all of the references cited in the synonymy below really belong to this species. My identification of specimens from Guiana as belonging to this species was wrong.

4. *Pygocentrus piraya* Cuvier. (Plate XLIV.)

Piraya MARCGR., Nat. Hist. Bras., 1648, p. 164.

Serrasalmo piraya CUVIER, Mem. Mus. Paris, Vol. V, 1819, p. 368, pl. 28, fig. 4; GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 368 (Brazil; River Cupai; Demerara); COPE, Proc. Am. Philos. Soc., Phila., Vol. XI, 1869-70, p. 566 (Pará); STEINDACHNER, Flussfisch. Süd-am., Vol. II, 1881, p. 13 (Teffé, Rio Puty); PERUGIA, Ann. Mus. Civ. Storia Nat., Genova, Ser. 2a, Vol. X, 1891, p. 51 (Villa Maria, Matto Grosso, Rio Paraguay).

Pygocentrus piraya MÜLLER & TROSCHER, Horæ Ichthyol., Vol. I, 1845, p. 20; CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 291; MÜLLER & TROSCHER, in Schomburgk, Reisen, Vol. III, 1848, p. 636 (Brit. Guiana); ? CASTELNAU, Anim. Amer. Sud Poiss., 1855, p. 72, pl. 38, fig. 2 (Goyaz; Amazon); KNER, Characinen, Vol. II, 1859, p. 28; EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 59; ULREY, An. N. Y. Acad. Sci., Vol. VII, 1895, p. 297 (Trocera on Tocantins). FOWLER, Proc. Acad. Nat. Sci., Phila., 1906, p. 468 (Pará); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Serrasalmo (Pygocentrus) piraya LÜTKEN, Velhas-Flodens Fiske, 1875, p. 233, and p. xvii (Rio das Velhas).

Serrasalmo piranha AGASSIZ, Selecta Genera et Spec. Pisc. Bras., 1829, p. 71, tab. 28 (Rio San Francisco); SCHOMBURGK, Fish. Brit. Guiana, Vol. I, 1841, p. 221, pl. xvi (Rio Branco).

? *Serrasalmo nigricans* AGASSIZ, Selecta Genera et Spec. Pisc. Bras., 1829, p. 72, tab. 30.

? *Pygocentrus nigricans* MÜLLER & TROSCHER, Horæ Ichthyol., Vol. I, 1845, p. 21.

Pygocentrus bidorsalis NATTERER, MS. in Kner, Characinen, Vol. II, 1854, p. 28.

Distribution.—Guiana, Amazon to Rio das Velhas, and ?Paraguay.

It is probable that Perugia's record is for *R. nattereri*.

5698 a-b. C. M. 35-43 mm. Santa Rita, Jan. 24, 1909. Haseman.

5696 a. C. M. 60 mm. Barreiras, Lagoas of Rio Grande, Jan. 3-4, 1907. Haseman.

6521 a-g. C. M. 18-about 240 mm. Penedo, May 20, 1908. Haseman.

5699 a-h. C. M. Largest 44 mm. Boqueirão, near mouth of Rio Preto, Jan. 6, 1908. Haseman.

6522 a-c. C. M. 108-202 mm. Joazeiro, Nov. 28, 1907. Haseman.

6523 a. C. M. 122 mm. Rio das Velhas, May 11, 1908. Haseman.

6524 a. C. M. 190 mm. Lagoa de Porto, Dec. 24, 1907. Haseman.



Head 3-3.6 in length to end of lateral line; depth 1.8-2; D. 18-19; A. 30-32; serræ 22-26; interorbital 2-2.25 in the head (nearly 3 in No. 5696).

Base of anal shorter than head; distance between dorsal and caudal fulcra shorter than the dorsal, equal to, or a little shorter than, the postorbital portion of the head (postorbital portion and half the eye in No. 5696); dorsal rounded; adipose fin not rayed in specimens 130 mm. long. Sides plain in specimens 100 mm. long; entire sides profusely spotted in specimens below 60 mm. long.

Dr. J. D. Anisits has kindly furnished me with the following data on the *Pygocentrus nigricans* in the Berlin Museum.

No. 3630 Berlin Museum. Total length 122 mm., body 112 mm., height 61 mm. Head 3 in the length; eye 4.33 in the head, 2.66 in the interorbital; abdominal spines 28; D. 16; A. 31; scales 34-104-39. The photograph kindly made for me by the direction of Dr. A. Brauer, Director of the Zoölogical Museum of Berlin, shows the distance between the dorsal and caudal to be greater than the length of the dorsal and longer than the postorbital portion of the head. It seems more than probable that the *nigricans* of Müller and Troschel is distinct from *piraya* Cuvier.

Lütken (Vidensk. Medd. Nat. For. Kjöbenhavn, 1874, 238) considers the *nigricans* of Agassiz a species distinct from *piraya*.

IV. Genus ROOSEVELTIELLA⁴ gen. nov.

Type, *Serrasalmo nattereri* Kner.

General characters of *Pygocentrus*, the adipose fin not rayed; palate without teeth, smooth; cheek completely or nearly completely armed in adult; profile scarcely depressed over the eye; eye comparatively small; interorbital very wide; upper jaw short, its margin very oblique; lower jaw powerful, its teeth long, with nearly symmetric cutting edges, much larger than those of the upper jaw.

Distribution.—Orinoco, Guianas, Amazons, and La Plata basin. Not in the Rio San Francisco and coastwise streams south to Rio Grande do Sul.

It is doubtful whether *niger*, *altus*, and *nattereri* are distinct. It is also quite probable that *stigmaterythræus* is a synonym of *notatus*.

⁴For Colonel Theodore Roosevelt in recognition of his arduous work in South American Exploration and his intense interest in the fauna of South America. His account of the type of this genus was quoted on previous pages.

KEY TO THE SPECIES OF ROOSEVELTIELLA.

- a. Cheeks fully covered by the second suborbital except in the young.
- b. Abdominal serræ 40; depth about 2 in the length; interorbital a little less than one-half the length of the head; *second infra-orbital touches the pre-opercle*; distance between dorsal and upper caudal fulcra much longer than base of dorsal; gill-rakers of the outer branch very short and broad. D. 18; A. 33-35; lat. line 105. *niger* (Schomburgk). 5.
- bb. Abdominal serræ fewer than 40.
- c. Distance between dorsal and upper caudal fulcra less than the base of the dorsal, equal to the postorbital portion of the head, or shorter; origin of dorsal about equidistant between anterior margin of eye and end of lateral line; base of anal shorter than head; D. 16-19; A. 27-31; serræ 22-38; interorbital 2.1 in head; depth 1.87-2. *nattereri* (Kner). 6.
- cc. Distance between dorsal and upper caudal fulcra equal to, or a little greater than, the base of the dorsal, equal to the postorbital portion of the head; origin of dorsal equidistant between end of lateral line and snout or origin of eye; base of anal equal to length of head in the younger; equal to head without opercle in the old; interorbital 2-2.23 in the head; head 3.3-3.25; depth 1.8-2.2. *notatus* (Lütken). 7.
- aa. Cheeks with a very narrow naked margin.
- d. No well defined humeral spot; distance between dorsal and upper caudal fulcra about equal to the length of the base of the dorsal, a little greater than the postorbital portion of the head; origin of dorsal nearer base of upper caudal rays than eye; base of anal equal to length of head less half of the opercle; D. 17; A. 23; serræ 26; interorbital 2.2 in the head; depth 1.8. *altus* (Gill). 8.
- dd. A large conspicuous humeral spot; space between dorsal and caudal longer than the dorsal, equal to head without opercle; base of anal shorter than head; second suborbital as high as long; D. 18 or 19; A. 30; serræ 28; interorbital 2.25 in the head; head 3.33; depth 1.9; sides spotted, caudal margined with dark. *stigmaterythraus* (Fowler). 9.

5. *Rooseveltiella niger* (Schomburgk). (Plate XLV.)

Serrasalmo niger SCHOMBURGK, Fishes Brit. Guiana, Vol. I, 1841, p. 222, tab. 18 (in streams between forty and fifty miles from coast); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 369.

Pygocentrus niger MÜLLER & TROSCHEL, Horæ Ichthyol., Vol. I, 1845, p. 21, tab. 2, fig. 3; ? CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 286 (Corentyn); MÜLLER & TROSCHEL, in Schomburgk, Reisen. Vol. III, 1848, p. 636 (upper courses of all streams of Guiana); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 59; EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442; Mem. Carnegie Mus., Vol. V, 1912, p. 384.

Distribution.—Upper courses of all streams of Guiana.

In spite of the many references, the only authentic specimen of this species is the type in the Berlin Museum, which I examined, and which has forty abdominal serræ.

Dr. J. D. Anisits has kindly reëxamined the type, No. 3631 Berlin Museum, and has given me the following data. Total length 365 mm., body 335, height 180. Head 3 in the total length; eye 5 in the head, 3 in the interorbital; abdominal serræ 40–41; D. 17, A. 34; scales about 40–130–42. I owe to Director Dr. A. Brauer the photograph of the type, which is reproduced in Plate XLV.

6. *Rooseveltiella nattereri* (Kner).

Serrasalmo nattereri KNER, Characinen, Vol. II, 1859, p. 28, taf. 3, fig. 8 (Matto Grosso; Cuyabá); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 369; COPE, Proc. Acad. Nat. Sci., Phila., 1871, p. 292 (between Rio Negro and Ucayale); PETERS, Mb. Ak. Wiss. Berlin, 1877, p. 472 (San Fernando de Apuré); PELLEGRIN, Bull. Mus. d'Hist. Nat., 1899, p. 406 (Manaos); BOULENGER, Boll. Mus. Univ., Torino, Vol. XV, 1900 (near Corumbá); FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, p. 468 (Peruvian Amazon).

Serrasalmo (Pygocentrus) nattereri STEINDACHNER, Flussfisch. Süd-am., Vol. III, 1881, p. 12 (La Plata).

Pygocentrus nattereri EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; BERG, An. Mus. Nat. Buenos Aires, Vol. V, 1897, p. 283 (San Pedro on Rio Paraná; Martín García; Boca de Riachuela on Rio de la Plata); EIGENMANN & OGLE, Proc. U. S. Nat. Mus., Vol. XXXIII, 1907, p. 35 (Paraguay; Brazil); EIGENMANN, Ann. Carnegie Mus., Vol. IV, 1907, p. 141 (Porto Murtinho; Corumbá); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—La Plata and Amazon basins; ?Orinoco.

6528 *a-b*. C. M. 118–126 mm. San Joaquin, Bolivia, Sept. 4, 1909. Haseman.

6529 *a*. C. M. 173 mm. about. Santarem, Dec. 6, 1909. Haseman.

6526 *a-b*. C. M. 149 mm. to end of lateral line. Villa Hays, April 13, 1909. Haseman.

6533 C. M. 1.15 mm. Rio Jauru, June 4, 1909. Haseman.

6527 *a*. About 24 mm. Corumbá, April 28, 1909. Haseman.

D. 17–19; A. 28–31; serræ 24–28; interorbital 2–2.1 in the head; depth 1.87–2; anal shorter than head, even in small, equal to head without opercle in large individuals; origin of dorsal equidistant from anterior margin of orbit and end of lateral line. Base of dorsal

equal to head without mouth or without snout and half eye. Distance between dorsal and upper caudal fulcra equal to, or a little shorter than, the postorbital portion of the head, shorter than the base of the dorsal or rarely equal to it; ventral spines with broad transverse basis.

7. *Rooseveltiella notatus* (Lütken).



FIG. 2. Premaxillary and mandibular teeth of *Rooseveltiella notatus* (Lütken).

Serrasalmo (*Pygocentrus*) *notatus* LÜTKEN, Vid. Med. Nat. For. Kjöb., 1874, p. 238 (Venezuela).

Pygocentrus notatus EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Pygocentrus piraya (non CUVIER) EIGENMANN, Mem. Carnegie Mus., Vol. V, 1912, p. 384 (Twoca Pan).

Distribution.—Orinoco, Essequibo, and Amazon basins.

6530 *a*. C. M. About 215 mm. over all. Manaos, Nov. 17, 1909. Haseman.

6531 *a*. C. M. About 230 mm. Lagoa de Paranagua, Jan. 16, 1908. Haseman.

?5695 *a-b*. C. M. 20-46 mm. Lagoa de Paranagua, Jan. 17, 1908. Haseman.

6532 *a-c*. C. M. About 125-145 mm. Santarem, Dec., 1909. Haseman.

These specimens may represent *Pygocentrus notatus* Lütken.

Lütken states that the origins of the dorsal and ventral fins are equidistant from the snout. In all of the specimens enumerated above the distance between the ventrals and the snout is less by at least an orbital diameter than the distance from the snout to the dorsal. In other respects they are like *notatus* as far as Lütken's description goes.

Head 3.29-3.25 in length to end of lateral line; depth 1.8-2.2; D. 16-18, usually 17, counting everything; A. 28-31, of which the first is minute and the third very large; serræ 26-28; interorbital 2-2.23 in the head; eye 4.5-5.5 in the head; origin of dorsal equidistant from tip of snout and end of lateral line; space between dorsal and caudal fulcra equal to the base of the dorsal or a little longer, equal to the head less the opercle or shorter; second suborbital in the adult in contact with the pre-opercle, leaving a naked border at the angle in the younger specimens; depth of caudal peduncle 2.5-2.75 in length of head in the smaller specimen, 3.33 in the larger; adult with a faint humeral spot, otherwise without spots; young with the sides profusely spotted. Caudal margined with dark, its base with a V-shaped dark area; in the smallest from Lagoa de Paranagua, there is a dark band on the end of the caudal peduncle.

Very similar to *Serrasalmo maculatus*, but without traces of teeth on the palate, the snout shorter, the interorbital wider, the serræ fewer.

8. *Rooseveltiella altus* (Gill). (Plate XLVI.)

Pygocentrus altus GILL, Proc. Acad. Nat. Sci. Phila., 1870, p. 93 (Marañon or Napo River); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 80; EIGENMANN & OGLE, Proc. U. S. Nat. Mus., Vol. XXXIII, 1907, p. 35 (Napo or Marañon); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—Marañon basin.

D. 17; A. 33; depth .8; head 2.75; snout obtuse, less than diameter of eye, which is 4.5-5 in the head; interorbital 2.2 in the head; a narrow naked area between suborbital and pre-opercle; fourteen teeth in each jaw; origin of dorsal nearer base of upper caudal rays than eye, its height about half the length of the head; origin of anal under last half of dorsal; pectorals scarcely to ventrals; gill-rakers pointed, a little less than half the length of eye; twenty-six abdominal serræ. Grayish iridescent, tinged with bluish; sides with traces of very hazy round spots; dorsal spotted; anal and caudal dusky; scales 34-90-37.

Known only from the type in the U. S. National Museum, No. 21432. Collected by Orton in the Napo or the Marañon, for a photograph of which I am indebted to the authorities of the United States National Museum. (Cf. Plate XLVI.)

9. *Rooseveltiella stigmaterythræus* (Fowler).

Pygocentrus stigmaterythræus FOWLER, Acad. Nat. Sci. Phila., 1911, p. 424, fig. 3 (La Pedrita, on the Cano Uracoa, Venezuela).

Known only from the specimens respectively 4 and 5 inches long in the collections of the Philadelphia Academy. They differ from the smaller specimens of *notatus* in the large black humeral spot.

V. Genus PRISTOBRYCON gen. nov.

Type, *Pygocentrum calmoni* Steindachner.

Intermediate in technical characters between the fierce *Rooseveltiella* without palatine teeth, and the less blood-thirsty *Serrasalmo*, with a series of permanent teeth along the palate. They are the least destructive of the piranhas. Head short and deep, the snout short; palate with few or no teeth in the adult, the teeth sometimes, as in *aureus*, more fully developed in the young; cheeks only partly armed; mouth rather narrow, the upper jaw not very oblique, the lower jaw not very prominent.

Distribution.—Orinoco, Guiana, and Lower Amazon basin.

KEY TO THE SPECIES OF PRISTOBRYCON.

- a. Sides variously spotted.
- b. Margin of caudal pale.
- c. Depth 1.6-1.8; head 3.12-3.66; D. 15-17; A. 32-34; serræ 27-33; interorbital 2.25-2.5 in the head; profile but little depressed over eye; distance from dorsal to caudal equal to length of head, much longer than dorsal; upper half of sides with numerous very small black spots; .2-.4 of the cheek naked.
- scapularis* (Günther). 10.
- cc. Depth 1.6-1.7; head 3.1-3.75; D. 15-17; A. 32-37; serræ 22-35; interorbital 2.16 in the length of head; profile more depressed over eye; distance from dorsal to caudal longer than head; upper half of sides with larger, more or less prominent spots; .25-.5 of the cheek naked.
- aureus* (Agassiz). 11.
- ccc. Depth 1.33; head 3.66; D. 17; A. 40. *emarginatus* (Schomburgk). 12.
- bb. Margin of caudal dark. Depth 1.4-1.5; head 3.4-3.66; D. 15-16; A. 32 or 33; serræ 32-33; nearly half of the cheek naked; a small, obscure, humeral spot; small, dark spots on the upper half of body.
- calmoni* (Steindachner). 13.
- aa. Numerous dark brown cross-bands dividing below the lateral line into narrow stripes; second suborbital but little higher than eye, its length 1.5 in its height; greatest width of naked area of cheek equal to about one-half the length of the suborbital; head 3.33; depth 1.66; D. 17; A. 31 or 32; serræ 32; interorbital 2.75; origin of dorsal an orbital diameter nearer to snout than the base of the caudal. *striolatus* (Steindachner). 14.

10. *Pristobrycon scapularis* (Günther).

Serrasalmo scapularis GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 368 (British Guiana); PELLEGRIN, Bull. Mus. d'Hist. Nat., 1899, p. 157 (Apuré).

Pygocentrus scapularis EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 69; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 297 (Marajo); EIGENMANN & OGLE, Proc. U. S. Nat. Mus., Vol. XXXIII, 1907, p. 35 (South America).

Serrasalmo coccogenis FOWLER, Proc. Acad. Nat. Sci. Phila., 1911, p. 428, fig. 4 (La Pedrita, on the Cano Uracoa, Venezuela).

Habitat.—British Guiana, Orinoco, Amazon to Para.

5799 a-b. C. M. 140-197 mm. Manaos, Dec. 9, 1910. Haseman.

Very similar to *Serrasalmo aureus*, but not so deep, and to *calmoni*, which has a black bordered caudal.

Head 3.4-3.66 to end of lateral line; depth 1.7-1.8; D. 16 or 17; A. 32 or 33; serræ 26 + 1 and 28 + 1; interorbital 2.25-2.5 in the length of the head. Distance from dorsal to caudal fulcrum equals length of head, much greater than base of dorsal; origin of dorsal about equal to distance from tip of snout to end of lateral line; base of anal a little longer than head; suture between first and second suborbitals vertical; second suborbital leaving a naked area nearly half as wide as bone in the larger and but little narrower than the bone in the smaller specimen; palatines roughened more or less and with a tooth-like tubercle. Caudal pale-edged; upper parts of sides with small spots.

In the suture between the first and second suborbitals these specimens differ from the specimens from Guiana in which it extends downward and forward.

11. *Pristobrycon aureus* (Agassiz).

Serrasalmo aureus AGASSIZ, Selecta Genera et Spec. Pisc., 1829, p. 72, tab. 29; CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 282; CASTELNAU, Anim. Amer. Sud, Poiss., 1855, p. 71 (Goyaz); ? MÜLLER & TROSCHEL, in Schomburgk's Reisen, Vol. III, 1848, p. 637 (Essequibo, Rupununi); KNER, Characinen, Vol. II, 1859, p. 35 (Rio Vaupé, Matto Grosso).

Serrasalmo gymnogenys GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1874, p. 371 (River Capin, British Guiana); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 298 (Marajo); ? PERUGIA,⁵ Ann. Mus. Civ. Stor. Nat. Genova, 2a, Vol. X, 1891, p. 650 (Resistencia, Chaco Centrale); PELLEGRIN, Bull. Mus. d'Hist. Nat., Vol. V, 1899, p. 157 (Apuré); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442; Memoirs Carnegie Mus., Vol. V., 1912, p. 381 (Rockstone; Wismar; Tumatumari; Crab Falls below Packeo).

⁵ It is very probable that Perugia had either *Serrasalmo marginatus*, or *humeralis*.

Habitat.—Guiana, Orinoco, Amazons, and ?Paraguay.

5770 a. C. M. 158 mm. Santarem, Dec. 15, 1909. Haseman.

5800 a-b. C. M. About 150 and 182 mm. Manaos. Haseman.

Head 3.66-3.75; depth to end of lateral line 1.55-1.6; D. 16-17; A. 33-35; serræ 34 or 35; snout 1.5 in the eye; eye 3 in the head; interorbital 2.16; margin of second suborbital rounded, but leaving a naked area equal to one-fourth to one-third of the total width of the cheeks; space between dorsal and caudal longer than head; head 1.3-1.4 in the length of the anal; spots sometimes arranged in transverse rows, merging into irregular cross-bands in the largest specimen.

12. ***Pristobrycon emarginatus*** (Schomburgk).

Salmo emarginatus SCHOMBURGK, Fishes Brit. Guiana, Vol. I, 1841, p. 231, plate 19. (Locality?)

Schomburgk's figure represents a fish shaped like *P. aureus* or a *Metynnis*. It differs from the latter in having a short adipose fin. It is quite possible that the figure is that of *aureus*.

13. ***Pristobrycon calmoni*** (Steindachner). (Plate XLVII.)

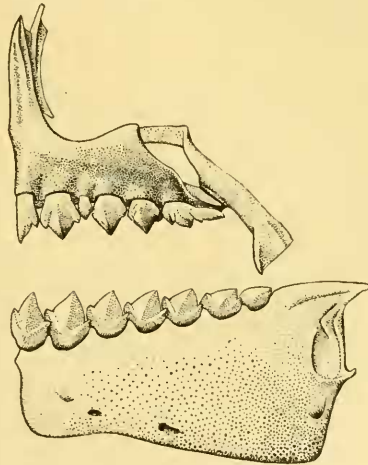


FIG. 3. Dentition of *Pristobrycon calmoni* (Steindachner). $\frac{1}{4}$.

Serrasalmo calmoni STEINDACHNER, Ann. K. Acad. Wiss. Wien, 1908, p. 361 (Pará).

Pygocentrus bilineatus EIGENMANN, Ann. Carnegie Mus., Vol. V, 1909, p. 47; Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442; Mem. Carnegie Mus., Vol. V, 1912, p. 385, pl. LVI, fig. 2 (Aruka River, Mora Passage).

5797 *a-b*. C. M. 66-132 mm. Santarem, Dec. 11, 1909. Haseman.
 5798 *a-c*. C. M. 105-125 mm. Pará, Jan. 17, 1910. Haseman.

Head 3.7-3.9; depth 1.5-1.6; D. 17; A. 32-34; serræ 30-33; interorbital 2.33-2.25; cheeks with a naked area equal in width to the suborbital; head 1.5 in the length of the base of the anal; palate with one or two teeth.

This species, greatly resembling *gymnogenys* = *aureus*, is readily distinguished by its black caudal border. The specimens from Pará differ from *P. calmoni*, for the most part as described by Steindachner, in only insignificant details; but the eyes in the specimens are certainly longer than the snout, the end of the upper jaw does not reach below the middle of the eye, and the origin of the ventrals is a little nearer the tip of the snout than the end of the anal. In the types of *bilineatus*, on the contrary, it is a little nearer the end of the anal.

14. *Pristobrycon striolatus* (Steindachner).

Serrasalmo (*Pygocentrus*) *striolatus* STEINDACHNER, Anz. K. Acad. Wiss. Wien, 1908, p. 360.

Known only from the types, 180-200 mm. long, coming from tributaries of the Rio Pará.

VI. Genus SERRASALMO Lacépède.

Serrasalmo LACÉPÈDE, Hist. Nat. Poiss., Vol. V, 1804, p. 283.

Type, *Salmo rhombeus* Linnæus.

Body deep, compressed; a series of serræ from below the pectorals to the anus. Teeth in the premaxillary in a single series, trenchant; usually a series of teeth on the palate, but in this respect grading through the heavier jawed, short-nosed species, like *maculatus*, into *Rooseveltiella*; second suborbital covering all or most of the cheek; tongue narrow, free, anal partly scaled; predorsal line naked.

Distribution.—Orinoco, and Guianas south to the Rio San Francisco and the La Plata basin. Not occurring in the Magdalena, on the Pacific slope, nor in the short rivers draining into the Atlantic between the Itapicurú and the Uruguay.

KEY TO THE SPECIES OF SERRASALMO.

- a*. Depth more than 2 in the length to the end of the lateral line. See also *S. humeralis gracilior*.
- b*. Interorbital 2.5-2.7 in the head; snout, which is acutely pointed, longer than the eye; chin sharply pointed, entering the profile; lower jaw 2 in

- the head. D. 15; A. 32-33; abdominal serræ 31-35; head 3; depth 2.66; eye 5 in the head, 2 in interorbital; profile nearly straight; lateral line 100; predorsal line naked; a dark humeral spot; sides with dark spots; back sometimes with parallel bands; dorsal, anal, and adipose with light base and dark margin. *elongatus* Kner. 15.
- bb.* Snout blunt, about equal to the eye in length; D. 16; A. 30; abdominal serræ about 27; head 3.2; eye 4 in the head; profile but slightly concave. Caudal with a dark margin. *gibbus* Castelnau. 16.
- bbb.* Snout not very blunt, longer than eye; one-third of cheeks naked in the types; D.16; A.32; serræ 37. Caudal with a light margin.
hollandi Eigenmann. 17.
- aa.* Depth 2 or less than 2 in the length, rarely 2.1 or 2.33 in *humeralis gracilior*.
- c.* Caudal with a submarginal black band, the margin hyaline; interorbital 2.5 in the length of the head; snout blunt.
- d.* Depth 1.6 to end of lateral line; bright yellow; a humeral shade, otherwise unspotted. *æsoopus* Cope. 18.
- dd.* Depth 1.75-1.92; sides spotted. *spilopleura* Kner. 19.
- cc.* Caudal in adult with a marginal black band; anal with a dusky margin.
- e.* Snout blunt; interorbital 2.33-2.5 in the length of the head (nearly 3 in small specimens); margin of second suborbital convex.
- f.* Snout shorter than the eye; interorbital 2.5 in the head, even in specimens but 120 mm. long. Depth 1.8-1.9; D. 15 or 17; A. 31-33; serræ 31-34; cheeks entirely or nearly entirely covered; lower jaw heavy. (Palatine teeth sometimes wanting?) *maculatus* Kner. 20.
- (ff.* Snout shorter than eye; interorbital 2.4 in the head. Depth 1.7; D. 17; A. 32; serræ 33; cheeks with a wide naked area; lower jaw not very heavy; palate with teeth? See *Pristobrycon scapularis* and *calmoni*.)
- fff.* Snout longer than eye; D. 16 or 17 rarely 19; A. 31-36; serræ, rarely 28 or 36; lateral line 87-91; depth 1.8-2.
rhombeus Linnæus. 21.
- ffff.* Snout longer than eye; interorbital 2.8-nearly 3 in the length of the head; D. 15 or 16; A. 32-33; serræ 30-31; depth 1.8; head 3-3.2. Snout about 3 in the length of the head; eye 5-5.4; second suborbital leaving but a narrow naked strip below. *paraëuse* Steindachner. 22.
- ee.* Snout more acute; head compressed, interorbital 3 or more in the length of the head (3 in the largest).
- g.* Anal slightly falcate, the third ray heavy; second suborbital more or less truncate, leaving a wider naked space than in *rhombeus* or *brandtii*; ventral serræ very strong, 26-33, most frequently 30; depth 2, rarely 1.7; D. 15-18, usually 17; A. 32-36, usually 33 or 34.
humeralis Cuvier & Valenciennes. 23.
- gg.* Characters of *humeralis* but the depth 2.33 in the length to end of lateral line. *gracilior* Eigenmann. 24.

ggg. Anal rounded in front, or the third ray, which is but little heavier than the following one, slightly prolonged, milk-white; second suborbital convex below; ventral serræ much more feeble than in *humeralis*, 30-35, most frequently 34; depth 1.8; D. usually 16 or 17; A. 33-37, most frequently 35.

brandti Reinhardt. 25.

ccc. Margin of caudal light, no submarginal black band.

h. Margin of anal light; snout blunt, six tenths as long as eye, or equal to the eye; a considerable naked area on the cheek; D. 15 or 16, A. 32-37; serræ 22-33 (See *Pristobrycon aureus* Agassiz.)

hh. Margin of anal dark in the adult; snout pointed, longer than snout of *aureus*, young slenderer than young of *aureus*.

marginatus Valenciennes. 26.

15. *Serrasalmo elongatus* Kner.



FIG. 4. Dentition of *Serrasalmo elongatus* Kner. (Enlarged.)

Serrasalmo elongatus KNER, Characinen, Vol. II, 1859, p. 36, taf. v, fig. 12 (Rio Guaporé, Matto Grosso); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 371; STEINDACHNER, Flussf. Südam., Vol. IV, 1882, p. 16 (Huallaga); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XVI, 1891, p. 60; EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—Rios Guaporé and Amazon.

5757 a-c. C. M. Three, 164 to about 200 mm. Santarem, Dec. 8, 1909. Haseman.

Head 3.3-3.6; depth 2.3-2.44 in the length to the end of the lateral line. D. 15; A. 30 in two, 31 in one; serræ 34, 35, 36; eye about 1.5 in the snout, 5-5.5 in the head, 2-2.2 in the interorbital; lower posterior margin of the second interorbital subtruncate, leaving a segment of a circle of the cheek naked. Gill-rakers minute.

5796 a. C. M. 40 mm. Bastos on the Rio Alegre, a tributary of the Guaporé. June 26, 1909. Haseman.

Head 2.75; depth 2.25; D. 17; A. 35; serræ 26; eye 3 in the head; interorbital 4. Distal half of dorsal and caudal, distal half of anal lobe and anal margin jet black; sides spotted.

This specimen differs conspicuously from the adult of *elongatus*. Many of its characters are, however, undoubtedly due to its youth, and in all likelihood it is the young of *elongatus*.

16. *Serrasalmo gibbus* Castelnau.

Serrasalmo gibbus CASTELNAU, Anim. Am. Sud, Poiss, 1855, pl. 38, fig. 1 (Araguay);

EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60.

Serrasalmo gibbus GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 366; EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Habitat.—Araguay.

Known only from Castelnau's figure. It is probably a synonym of *elongatus*.

17. *Serrasalmo hollandi*⁶ Eigenmann, sp. nov. (Plate XLVIII.)

5792 a. C. M. About 130 mm., 109 mm. to end of scaled portion of caudal. Maciél, Rio Guaporé, July 23, 1909. Haseman.

Depth 2.16; head 3.33; D. 16; A. 32; serræ 37; scales 31-86-27; eye 3.66 in head, snout 4, interorbital 2.6; depth of caudal peduncel 3.33. Origin of dorsal about an orbital diameter nearer snout than end of lateral line; distance of dorsal from upper caudal fulcra equals length of head; base of dorsal equals length of head less snout and half the orbit, but little greater than its distance from the adipose; origin of anal equidistant from the base of the last ray and the middle of the pectoral; origin of ventrals a little nearer tip of snout than the distance between snout and predorsal spine.

Elongate, compressed; dorsal and ventral profiles about equally curved; dorsal profile but little depressed over eye, snout not very blunt, the lower jaw scarcely entering profile; occipital process about

⁶ Named for my friend, Dr. W. J. Holland, Director of the Carnegie Museum. C. H. Eigenmann.

2.7 in the distance from its base to the dorsal; palatines with five well developed teeth; about one-third of the cheek naked at its widest.

Serræ well developed; dorsal elevated in front; anal slightly emarginate in front; ventrals about 2 in the head without the opercle, equal to the longest anal ray.

Sides with numerous circular spots about the size of the pupil; an angular humeral spot, larger than the other spots; a V-shaped basal caudal spot; anal and distal portion of caudal hyaline.

18. *Serrasalmo æsopus* Cope.

Serrasalmo æsopus COPE, Proc. Acad. Nat. Sci., Phila., 1871, p. 269 (Amazon between Rio Negro and the Huallaga); EIGENMANN & EIGENMANN, Proc. U. S. Mus., Vol. XIV, 1891, p. 60; FOWLER, Proc. Acad. Nat. Sci., Phila., 1906, p. 469, fig. 53 (note, and figure of the type from the Amazon between Rio Negro and Huallaga); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—Upper Amazon.

This species is known only from the type, five and seven-eighths inches long, in the collection of the Philadelphia Academy. It may prove to be synonymous with *spilopleura*.

19. *Serrasalmo spilopleura* Kner. (Plate XLIX.)

Serrasalmo spilopleura KNER, Characinen, Vol. II, 1859, p. 35, taf. v, fig. ii (Matto Grosso, Guaporé, ? Bogota); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 370 (River Capin); Ann. & Mag. Nat. Hist., 1880, p. 13 (La Plata); EIGEN-

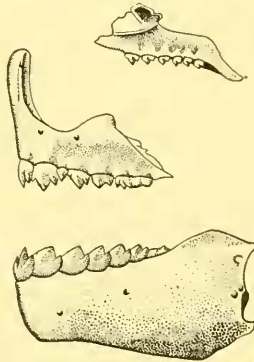


FIG. 5. Dentition of *Serrasalmo spilopleura* Kner. $\frac{2}{1}$.

MANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 297 (Tocantins, Brazil); PERUGIA, Ann. Mus. Civ. Stor. Nat. Genova, Ser. 2, Vol. VIII, 1897, p. 26 (Bolivia); BOULENGER, Trans. Zool. Soc. London, Vol. XIV, 1896, p. 37 (Descalvados and

Paraguay); Boll. Mus. Univ. Torino, Vol. XV, 1900 (near Corumbá); EIGENMANN & OGLE, Proc. U. S. Nat. Mus., Vol. XXXIII, 1909, p. 35 (Paraguay); EIGENMANN, Ann. Carnegie Mus., Vol. IV, 1907, p. 141 (Rio Otuquis, Asuncion; Porto Murtinho)—Reports Princeton Univ. Exp., Patagonia, Vol. III, 1910, p. 442.

Pygocentrus dulcis HECKEL MS. in Kner.

Distribution.—Basin of Amazon and La Plata.

The record of "Bogota," if by this is meant the capital of Colombia, is certainly wrong. The species is apparently quite abundant in the Paraguay basin.

Distinguished by the intense submarginal black caudal band, and spotted sides.

5774 *a-f.* C. M. 54-165 mm. Rio Jauru, June 4, 1909. Haseman.

5775 *a-b.* C. M. 44-49 mm. Caceres, May 26, 1909. Haseman.

5776 *a.* C. M. 90 mm. Rio San Francisco, June 10, 1909. Haseman.

5795 *a.* C. M. 37 mm. Bastos, June 26, 1909. Haseman.

5777 *a-d.* C. M. 45-120 mm. San Joaquin, Bolivia, Sept. 4 and 5, 1909. Haseman.

5778 *a-d.* C. M. 44-154 mm. Cacequy, Feb. 1, 1909. Haseman.

5779 *a-i.* C. M. 46-83 mm. Uruguayana, Feb. 5, 1909. Haseman.

5761 *a-c.* C. M. 104 mm. Riberão Azul, 22 miles northeast of Salto das Cruzes, tributary of the Rio Tieté. Oct. 7, 1908. Haseman.

5780 *a-b.* C. M. 113 mm. Pará, Jan. 17, 1910. Haseman.

5781 *a.* C. M. 44 mm. Corumbá, April 27, 1909. Haseman.

The counts of a number of specimens are: D. $\frac{15^7}{4}$, $\frac{16}{6}$, $\frac{17}{4}$; A. $\frac{30^7}{1}$,

$\frac{32}{4}$, $\frac{33}{1}$, $\frac{34^7}{1}$.

20. *Serrasalmo maculatus* Kner.

Serrasalmo maculatus KNER, Characinen, Vol. II, 1859, p. 33, taf. iv, fig. 10 (Rio Guaporé); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 371; COPE, Proc. Am. Philos. Soc., Vol. XI, 1870, p. 566 (Pará); STEINDACHNER, Flussf. Süd-am., Vol. IV, 1882, p. 16 (Huallaga); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 298 (Tocantins); PERUGIA, Ann. Mus. Civ. Stor. Nat., Genova, Ser. 2, Vol. VIII, 1897, p. 26 (Rio Madidi, Bolivia); PELLEGRIN, Bull. Mus. d'Hist. Nat., 1899, p. 406 (Manaos); FOWLER, Proc. Acad. Nat. Sci., Phila., 1906, p. 469 (Pará, notes on Cope's specimen); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

⁷ The denominator indicates the number of specimens having the given character.

Pygocentrus melanurus HECKEL, Ms. in Kner, l. c.

Pygocentrus nigricans HECKEL Ms. in Kner, l. c.

Serrasalmo brandti ULREY (not Lütken), Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 298 (Brazil).

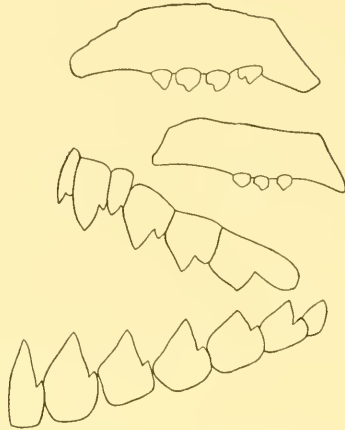


FIG. 6. Dentition of *Serrasalmo maculatus* Kner. The upper cut represent the palatines of a specimen 177 mm. long, the others are from a specimen 147 mm. long. (Greatly enlarged.)

Distribution.—Amazons to Bolivia.

5790 *a-d*. C. M. 120–188 mm. Manaos, Dec. 9 and 11, 1909. Haseman.

Depth 1.74–1.8; D. 16 or 17; A. 31–34; serræ 32–34; interorbital 2.52–2.66 in the head. Origin of dorsal nearer tip of snout than end of lateral line in the two smaller specimens equidistant from anterior nares and end of lateral line in the largest; distance between dorsal and base of upper caudal fulcra longer than the base of the dorsal, equal to the head or the part of the head behind the anterior nares; base of anal longer than head. Caudal bordered with dark.

21. *Serrasalmo rhombeus* (Linnæus). (Plate LVIII.)⁸

Salmo rhombeus LINNÆUS, Syst. Nat. ed. XII, Vol. I, 1766, p. 514 (Surinam); PALLAS, Spicil. Zool., Vol. VIII, 1769, p. 57, tab. 5, fig. 3; GMELIN, Syst. Nat., Vol. I, 1788, p. 686, no. 28; BLOCH, Ausl. Fische, p. 112, 1794, taf. 383; BLOCH & SCHNEIDER, Syst. Ichth., 1801, p. 404.

⁸The negative of Plate LVIII was made by Dr. Raymond C. Beeler in the Laboratory of Dr. Albert M. Cole, both of the gentlemen being residents of Indianapolis. I am greatly indebted to them for their kindness. The Author.

Serrasalmo rhombeus LACÉPÈDE, Hist. Nat. Poiss., Vol. V, 1804, p. 284; CUVIER, Mém. Mus. d'Hist. Nat., Vol. V, 1819, p. 367; CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 272 (Araguay); MÜLLER & TROSCHER, in Schomburgk. Reisen, Vol. III, 1848, p. 637 (Rupununi, Takutu); CASTELNAU, Anim. Amer. Sud. Poiss., 1855, pl. 37, fig. 3; GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 369 (Essequibo, Surinam, Demerara); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; ? BOULENGER, Ann. Mus. Civ. Stor. Nat. Genova, Ser. 2, Vol. XIX, 1898 (Puerto 14 Mayo); EIGENMANN, Reports Princeton Univ. Exp., Patagonia, Vol. III, 1910, p. 442;—Memoirs Carnegie Mus., Vol. V, 1912, p. 382 (Wismar, Crab Falls, Packeoo, Twoca Pan, Tumatumari, Rockstone).

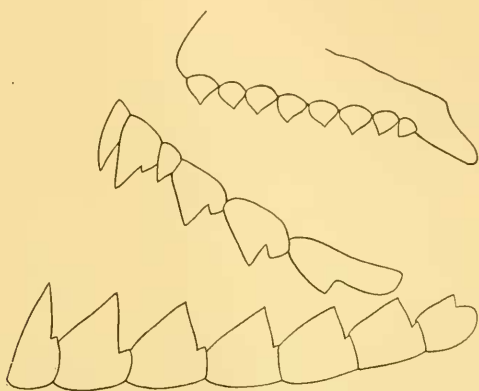


FIG. 7. Dentition of *Serrasalmo rhombeus* (Linnaeus). (Somewhat enlarged.)

Serrasalmo albus VALENCIENNES in Humboldt, Recherches Poissons Fluv. Rec. d'Observ. Zoologie, Vol. III, 1821, p. 173, pl. 47, fig. 1 (Orinoco).

Serrasalmo caribe CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1849, p. 279.

Serrasalmo immaculatus COPE, Proc. Amer. Philos. Soc., 1878, p. 692 (Peruvian Amazon); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, p. 471, fig. 54 (Peruvian Amazon, notes on the types); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—Guianas and Amazons.

The type of *immaculatus* figured by Fowler shows it to be a *rhombeus*. It is possible that the smaller cotypes are *humeralis*.

The *S. albus* is said to differ in having twenty dorsal rays. I have found nineteen in one specimen of *rhombeus* and until we find a species in the Orinoco with the characters assigned to *albus*, differing from *rhombeus*, *albus* may be put as a synonym of *rhombeus*.



5784 *a*. C. M. 174 mm. to end of lateral line. Manaos, Nov. 15, 1909. Haseman.

5785 *a-b*. C. M. 205 mm. Santarem, Dec. 11, 1909. Haseman.

5793 *a*. C. M. 305 mm. Santarem, Dec. 20, 1909. Haseman.

Haseman remarks of the last specimen "that it is jet black and goes by the name '*Piranha negro*.'"

22. *Serrasalmo paraense* Steindachner.

Serrasalmo (*Serrasalmo*) *paraense* STEINDACHNER, Anz. K. Acad. Wiss. Wien, 1908, p. 362 (Rio Pará).

Known only from the types.

23. *Serrasalmo humeralis* Cuvier and Valenciennes. (Plate L.)

Serrasalmo humeralis CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 279 (Amazon); KNER, Characinen, Vol. II, 1859, p. 30, taf. iv, fig. 9 (Rio Guaporé, Barra do Rio Negro, Cujaba, Villa Maria, Rio Paraguay); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864, p. 370; COPE, Proc. Acad. Nat. Sci. Phila., 1871, p. 292 (Ucayale); STEINDACHNER, Flussf. Süd-am., Vol. IV, 1882, p. 16 (Hualaga); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; PERUGIA, Ann. Mus. Civ. Stor. Nat. Genova, Ser. 2a, Vol. X, 1891, p. 50 (Resistencia, Chaco Centrale); BOULENGER, Trans. Zool. Soc. London, Vol. XIV, 1896, p. 37 (Descalvados and Paraguay); Boll. Mus. Univ. Torino, Vol. XV, 1900 (near Corumbá); FOWLER, Proc. Acad. Nat. Sci., Phila., 1906, p. 469 (notes on Cope's specimens); EIGENMANN, Ann. Carnegie Mus., Vol. IV, 1907, p. 141 (Porto Murtinho, Bahia Negra); Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Serrasalmo iridopsis COPE, Proc. Acad. Nat. Sci., Phila., 1871, p. 268, pl. ix, fig. 2 (Ambyiacu); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, p. 471 (Ambyiacu, note on the type, four and one-eighth inches long); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—Amazons and Paraguay.

Cope in his description of *iridopsis* states that there are forty-one abdominal serræ. Fowler in his reëxamination found but thirty-one. If there are but thirty-one serræ I can see no character by which this species differs from *humeralis*.

5786 *a-c*. C. M. 68 to about 144 mm. Rio Jauru, June, 1909, p. 204. Haseman.

5787 *a-m*. C. M. 25-126 mm. Villa Hays, April 11 and 13, 1909. Haseman.

5788 *a-b*. C. M. 58 and 77 mm. San Joaquin, Sept. 5, 1909. Haseman.

5782 a. C. M. About 170 mm., 157 mm. to end of lateral line.
Nov. 15, 1909. Haseman.

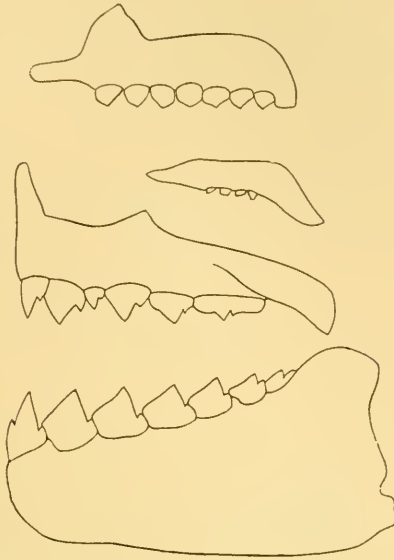


FIG. 8. Dentition of *Serrasalmo humeralis* Cuvier & Valenciennes. The upper cut represents the palatines of a specimen 170 mm. long, the rest are from a specimen 133 mm. (Greatly enlarged.)

5783 a-g. C. M. 62-114 mm. Santarem, Dec. 8-11, 1909. Haseman.

5769 a-c. C. M. 41 to about 180 mm. Lagoa de Paranagua, Jan. 16, 1908. Haseman.

The counts and measurements of a number of specimens are as follows: D. $\frac{15}{1}$, $\frac{16}{3}$, $\frac{17}{6}$, $\frac{18}{2}$; A. $\frac{32}{1}$, $\frac{33}{3}$, $\frac{34}{5}$, $\frac{35}{1}$, $\frac{36}{1}$; serræ $\frac{26}{2}$, $\frac{28}{1}$, $\frac{30}{4}$, $\frac{31}{2}$, $\frac{33}{2}$. The denominator indicates the number of specimens having the given character.

Depth in the length to end of lateral line, 1.8-2.

24. *Serrasalmo humeralis gracilior* Eigenmann, var. nov.

The following specimens are very much slenderer than typical specimens of *humeralis*.

5791 *a-b*. About 145 and 160 mm. Maciél, Rio Guaporé, July 23, 1909.

Depth 2.33-2.3 to end of scaled portion of caudal; head 3.33-3.4; D. 17; A. 33 and 34; serræ 30; eye 1 in snout, 4.5 in head; 1.5 in interorbital. A large humeral spot, caudal with a dark V-shaped basal bar and broadly margined with dark.

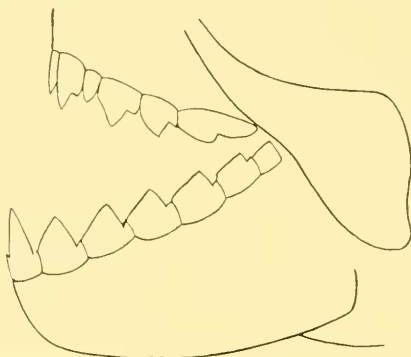


FIG. 9. Dentition of *Serrasalmo humeralis gracilior* Eigenmann. (Enlarged.)

Origin of dorsal a little nearer end of lateral line than tip of snout. Differing from typical *humeralis* by having the back less elevated, the dorsal more rounded.

25. *Serrasalmo brandti* Reinhardt. (Plate LI.)

Serrasalmo brandtii LÜTKEN, Velhas-flodens Fiske, 1875, p. 237 with fig. and p. xviii (Rio das Velhas); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; EIGENMANN & OGLE, Proc. U. S. Nat. Mus., Vol. XXXIII, 1907, p. 35 (Lagoa Santa); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Distribution.—Rios San Francisco and Itapicurú. This species is abundant in the San Francisco basin from which the following were taken.

5762 *a-g*. C. M. 120-190 mm. Joazeiro, Nov. 28, 1907. Haseman.

5763 *a-h*. C. M. 27-112 mm. Penedo, March 20, 1908. Haseman.

5764 *a-h*. C. M. 26-178 mm. Barreiras, Jan. 3 and 4, 1908. Haseman.

5693 *a*. C. M. 34 mm. Barra de Penedo, April 8, 1908. Haseman.

5690 *a-s*. C. M. 18-32 mm. Boqueirão, Jan. 6, 1908. Haseman.

5765 *a-b*. C. M. 44 and 92 mm. Januária, Dec. 12, 1907. Haseman.

- 5766 *a-z*. C. M. 27-112 mm. Cachoeira de Pirapora, Dec. 15, 1907. Haseman.
 5767 *a-z*. C. M. 17-55 mm. Lagoa Pereira, Barra, Dec. 23, 1907. Haseman.
 5768 *a-f*. C. M. 24-65 mm. Lagoa de Porto near Barra, Dec. 24, 1907. Haseman.
 5692 *a*. C. M. 30 mm. Rio Grande near Cidade do Barra, Dec. 24, 1907. Haseman.

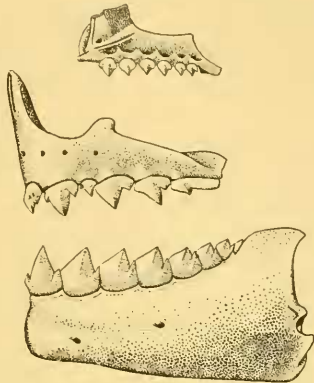


FIG. 10. Dentition of *Serrasalmo brandti* Reinhardt. $\frac{2}{1}$.

- 5758 *a*. C. M. 229 mm. Lagoa de Porto near Barra, Dec. 24, 1907. Haseman.
 5691 *a-g*. C. M. 32-50 mm. Santa Rita, Jan. 24, 1908. Haseman.
 The following specimens were taken outside the San Francisco basin:
 5759 *a*. C. M. 199 mm. Rio Zinga, emptying into Itapicurú, Nov. 7, 1907. Haseman.
 5760 *a-u*. C. M. 16-84 mm. Queimadas, Rio Itapicurú, March 2, 1908. Haseman.
 5689 *a-h*. C. M. 24-76 mm. Rio Paqui, Baixa Grande, Nov. 14, 1907. Haseman.
 5694 *a-b*. C. M. 34 to about 43 mm. Cachoeira, Rio Paraguassu., April 14 and 17, 1908. Haseman.

Anal rounded in front, or the third ray, which is but little heavier than the following one, slightly prolonged; second suborbital convex below; ventral serræ much more feeble than in *humeralis*. D. $\frac{15}{1}$.

$\frac{16}{5}$, $\frac{17}{6}$; A. $\frac{33}{2}$, $\frac{34}{2}$, $\frac{35}{4}$, $\frac{36}{1}$, $\frac{37}{2}$; serræ $\frac{30}{1}$, $\frac{31}{1}$, $\frac{32}{2}$, $\frac{33}{1}$, $\frac{34}{4}$, $\frac{35}{2}$; length to end of lateral line 1.7-2.1.

26. *Serrasalmo marginatus* Valenciennes.

Serrasalmo marginatus VALENCIENNES in d'Orb. Voy. Amer. Merid. Poiss., 1847, p. 10, pl. 10, fig. 1; CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. XXII, 1848, p. 277 (Corrientes); KNER, Characinen, Vol. II, 1859, p. 32 (Guaporé, Cuyabá); GÜNTHER, Cat. Fishes Brit. Mus., Vol. V, 1864; Ann. & Mag. Nat. Hist., 1880, p. 13 (La Plata); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 297 (Brazil); BERG, Com. Mus. Nac. Buenos Ayres, 1, 1899, p. 166 (Buenos Aires); EIGENMANN & OGLE, Proc. U. S. Nat. Mus., Vol. XXXIII, 1907, p. 35 (Paraguay).

Serrasalmo humeralis CASTELNAU (*non* Cuvier & Valenciennes), Anim. Am. Sud. Poiss., 1855, pl. 37, fig. 2; EIGENMANN & KENNEDY, Proc. Acad. Nat. Sci., Phila., 1903, p. 528 (Rio Paraguay and Arroyo Trementina); EIGENMANN, Reports Princeton Univ. Exp. Patagonia, Vol. III, 1910, p. 442.

Serrasalmo iritans PETERS, Mb. Ak. Wiss., Berlin, 1877, p. 472 (San Fernando de Apuré); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 60; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 298 (Marajo).

Serrasalmo iridopsis ULREY, (*non* Cope) N. Y. Acad. Sci., Vol. VII, 1895, p. 298 (Tocantins).

Distribution.—La Plata basin, Orinoco, Amazons.

5771 a. C. M. 76 mm. Berlin, Rio Mamoré, Sept. 15, 1909. Haseman.

D. 15; A. 34; serræ 34.

5772 a. C. M. 70 mm. San Joaquin, Sept. 5, 1909. Haseman.

D. 16; A. 34; serræ 33.

5773 a. C. M. 62 mm. Caceres, May 26, 1909. Haseman.

D. 16; A. 34; serræ 28.

5794 a-c. C. M. 45-66 mm. Rio Jauru, June 2, 1909. Haseman.

These specimens are all young and the identification is more or less doubtful. They may be the young of *humeralis* in which the terminal caudal bar has not yet developed. They differ otherwise from young *humeralis* in having the opercle dark below its middle.

Subfamily MYLINÆ.

Body compressed, deep; ventral surface with serræ; teeth of the premaxillary in two series; mandible with a single series of teeth and sometimes a pair of subconical teeth behind and in contact with the symphyseal pair of teeth; no teeth on the palate or on the maxillary;

dorsal comparatively long; ventrals minute; anal long; adipose variously developed; gill-rakers well developed.

KEY TO GENERA OF MYLINÆ.

- a. Teeth thorn-like, wide set and almost concealed by the lips and gums; premaxillary with two antrorse, large teeth in the front series and three smaller ones in the second series; no inner teeth in the lower jaw; mouth very oblique, lower jaw inordinately projecting; a predorsal spine; serræ along the ventral edge from below the pectorals to the anal; adipose large; cheeks entirely mailed. *Catoprion* Müller & Troschel. 1.
- aa. Teeth incisors or molars, not antrorse; lower jaw not much projecting, or the jaws equal, the mouth nearly horizontal; two teeth in the second transverse row of the premaxillary, five teeth in the front row, which may be continuous or broken, the teeth arranged stepwise from the last on the sides to the first in front.
- b. Mandibles without an inner pair of teeth; abdomen serrate behind the ventrals, smooth in front of them.
- c. Dorsal rays prolonged, filiform; anal in male bilobed.
Mylesinus Cuvier & Valenciennes. 2.
- cc. Dorsal rays scarcely prolonged, the margin of the fin oblique, not falcate; gill-rakers filamentous. *Acnodon* Eigenmann. 3.
- bb. Mandibles with a pair of teeth behind the symphyseal pair; abdomen with serræ in front, as well as behind the ventrals; second suborbital leaving a wide naked area.
- d. No predorsal spine.
- e. No supplementary scales; anal naked, as long as head or shorter, highest in front, without distinct lobes.
- f. Adipose dorsal rayed; opercle with a broad membranous border; gill-rakers numerous, very fine.
Piaractus Eigenmann. 4.
- ff. Adipose dorsal not rayed. Opercle with a narrow membrane. *Colosoma* Eigenmann. 5.
- ee. Numerous supplementary scales obscuring the primary ones and giving the surface a velvety texture; free margin of anal convex, the posterior part highest; anal scaled for at least half of its height, much longer than head; opercles with a narrow lobe; gill-rakers moderate in number and size.
Mylosoma Eigenmann. 6.
- g. Abdomen not excessively pendant. (*Mylosoma* Eigenmann.)
- gg. Abdomen excessively pendant, depth about 1.14.
(*Starksina* Fowler.)
- dd. A predorsal spine.
- h. Adipose fin long, more than half the length of the dorsal; dorsal with fewer than 20 rays; free margin of anal slightly convex or with a single lobe in front. *Metynnis* Cope. 7.
- i. Gill-rakers long, setiform. (*Metynnis* Cope.)
- ii. Gill-rakers equal to half the length of the eye or shorter.
(*Sealeina* Fowler.)

- hh.* Adipose fin short; gill-rakers short, lanceolate; dorsal rays 21-31; anal in male bilobed (in all species?), in the female falcate.
- j.* Individual dorsal rays of the male prolonged, filiform; teeth of the front series incisor-like and close to the posterior series. *Myletes* Müller & Troschel. 8.
- jj.* Individual dorsal rays not prolonged; teeth various. *Myloplus* Gill. 9.

The number of species available for study do not warrant a synopsis of the various genera.

I give below a list of the specimens in the Carnegie Museum, with descriptions of some new species and notes on some of the old species.

VII. Genus CATOPRION Müller & Troschel.

27. *Catoprion mento* (Cuvier).

- 5724 C. M. 117 mm. Santarem, Dec. 15, 1909. Haseman.
- 5725 C. M. 105 mm. Rio Boaventura, June 16, 1909. Haseman.
- 5726 *a-c.* C. M. 47, 57, and 107 mm. Maciél, Rio Guaporé, Aug. 10, 1909. Haseman.
- 5727 C. M. 87 mm. Bastos, June 28, 1909. Haseman.
- 5728 C. M. 67 mm. Rio Jauru, June 2, 1909. Haseman.
- Head 3.5; depth 1.66-2; D. 15-18; A. 36-38.

VIII. Genus COLOSOMA Eigenmann.

28. *Colosoma mitrei* (Berg). (Plate LII.)

- 6536 *a.* C. M. One, 315 mm. Caceres, May 27, 1909. Haseman.
- Head 3.8; depth 2; D. 17; A. 23; serræ 60 + 7; scales about 55-140-54.

29. *Colosoma bidens* (Agassiz).

- 5633 *a.* C. M. One, 165 mm. to end of middle caudal rays. Manaus, November 16, 1909. Haseman.
- 5634 *a-d.* C. M. Four, 160-220 mm. Santarem, Dec. 16, 1909. Haseman.
- 6535 *a.* C. M. One, 445 mm. San Antonio de Rio Madeira, Nov. 2, 1909. Haseman.

IX. Genus PIARACTUS Eigenmann.

30. *Piaractus nigripinnis* (Cope). (Plate LIII.)

- Myletes nigripinnis* COPE, Proc. Am. Philos. Soc., 1878, p. 693 (Peruvian Amazon); STEINDACHNER, Flussf. Süd-am., Vol. II, 1881, p. 25, pl. vii, fig. 1 (Teffé); EIGENMANN & EIGENMANN, Proc. U. S. Nat. Mus., Vol. XIV, 1891, p. 61; ULREY, Ann. N. Y. Acad. Sci., Vol. VII, 1895, p. 300 (Brazil).

Colosoma (Waiteina) nigripinnis FOWLER, Proc. Acad. Nat. Sci. Phila., 1906, p. 473, fig. 55 (Peruvian Amazon).

Habitat.—Amazons.

Fowler makes *nigripinnis* a new subgenus, basing it on the fact that the 'anterior and posterior series of teeth are well-separated anteriorly in the upper jaw,' but in the description, p. 474, he says, "In upper jaw five teeth in each external series approximated with our transverse annectant ones," and again, p. 475, he says, "Cope's

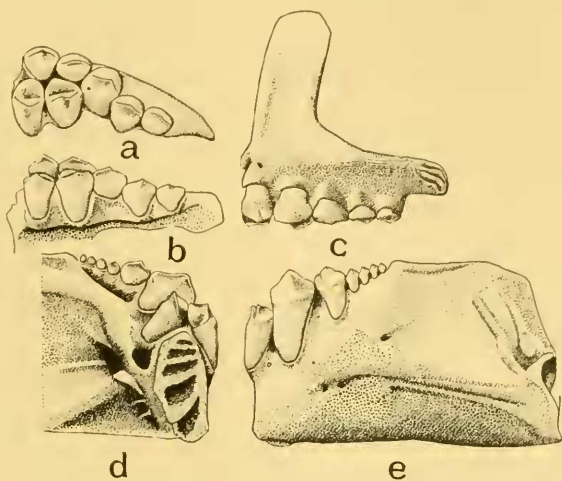


FIG. 11. Dentition of *Piaractus nigripinnis* (Cope). *a*, *b*, *c*, the premaxillary from below, within, and without, respectively. *d* and *e*, the dentary from within and without. $\frac{2}{1}$.

statement, that the two posterior mandibulars are in contact with the median pair of the anterior series, and are separated by a narrow interspace from each other, evidently refers to the teeth of the upper jaw." Doubting whether Cope meant the upper jaw when he wrote "mandibular," it is quite evident that Fowler again means to say that the anterior and posterior teeth of the upper jaw are in contact.⁸

The rays of the adipose are poorly represented in Fowler's figure, which is a fair representation of the following specimens:

5637 *a-b*. C. M. Two, 220 mm. Manaos, Nov. 16, 1909. Haseman.

⁸ I have recently examined the specimens described by Fowler and find that the teeth are in contact and that the subgenus *Waiteina* is a pure synonym.

5635 *a. C. M.* 195 mm., and 5636 *a-c*, five, 147-186 mm. Santarem, Dec., 1909. Haseman.

Head 2.6-3, measured to end of long opercle and end of scales; depth 1.8, D. 16 or 17, A. 25 to 27; scales 20 to 23-77 to 80-20 or 21. Abdominal serræ 45-50; eye 1 in snout, 4-4.5 in head, 2-3 in interorbital; naked portion of cheek 1-1.33 in the width of the second suborbital; greatest width of opercle 2-2.33 in its height.

Body compressed, subrhomboidal, the head very wide; profile depressed over the eyes, predorsal line naked; abdominal serræ all simple; frontal fontanel ovate, shorter, but wider, than parietal; occipital process extending about one-fourth to the dorsal, bordered by about ten scales; skull with various ridges; mouth moderate, mandible equals snout and half the eye; maxillary slender, concealed when the mouth is closed; opercle with strong radiating ridges, bordered by a very broad membrane; second suborbital narrow.

Gill-rakers fine, similar on both arches, almost half as long as the eye, about 36 + 40.

Origin of dorsal equidistant from end of scales at base of middle caudal rays and anterior part of eye; anterior dorsal rays equal length of head without opercle; distal portion of adipose fin rayed; depth of caudal peduncle equals the length of the opercle or less; caudal broad, its margin lunate when expanded, naked portion of the lobe nearly equal to the length of the head; origin of anal about equidistant from snout with the base of the last dorsal ray, highest rays equal to length of the head less half or the whole of the opercle; ventrals lanceolate, sometimes reaching nearly to origin of anal; pectorals extending a little beyond origin of ventrals.

Scales moderate, largest just beneath origin of dorsal, minute on adipose; caudal naked.

Fins steel blue. Middle of sides in the smallest with numerous round spots the size of the pupil or smaller; these become obscure with the development of surface pigment with age. Region below the lateral line smutty in adults, especially between the line and anal.

Depth of anterior air-bladder equals the length of the posterior, which is small, conical, as long as eye and half the snout; anterior bladder equal about to head less opercle.

Vertebræ 8 + 22 (counting those with hæmal canal and not counting the coalesced vertebræ); dorsal inserted on the sixth.

X. Genus MYLOSOMA Eigenmann.

31. *Mylosoma ocellatum* Eigenmann, sp. nov.?

5629 C. M. Type. 44 mm. and 5630 C. M. Paratypes, nineteen, largest 48 mm. Villa Hays, Paraguay, April 13, 1909.

These specimens may prove to be the young of *M. albiscopis*. Head 3; depth 1.30 in the largest, 1.5 in some of the smaller; D. 16-19; A. 33-36; abdominal serræ 39-48; eye 2.5 in the head; 1.33 in interorbital; very compressed, deep; profile steep, slightly concave at the occiput. Ventral profile pendulous; predorsal area naked. Ventral spines simple thorns (in the young only?) present both in front and behind ventrals. About half of the cheek is naked. Teeth of the premaxillary close together. Gill-rakers 12 + 13.

Origin of dorsal nearly equidistant from tip of snout and base of caudal, its highest ray equals head less opercle; depth of caudal peduncle equal to the length of the eye; origin of anal about equidistant from the snout with the adipose; margin of anal convex, the highest ray little if any more than snout and eye. Ventral small, its origin equidistant from snout with the posterior part of the dorsal, its tip reaching anal; *pectorals small, about equal to ventrals*, not nearly reaching ventrals.

Scales small, lateral line developed (in young?) to below dorsal or shorter; anal with a few scales along its base only.

Caudal hyaline; dorsal hyaline or with blackish; anal blackish; a black ocellus below the middle of the dorsal; sides with alternating light and dark cross-bands, the third light cross-band being continuous with the light about the ocellus.

32. *Mylosoma aureus* (Spix).

5721 *a-b*. C. M. Two, 75-77 mm. Berlin, Rio Mamoré, Sept. 15, 1909. Haseman.

5722 *a*. C. M. One, 90 mm. Santarem, Dec. 12, 1909. Haseman.

5723 *a-c*. C. M. Three, 147-170 mm. San Antonio, Rio Madeira, November 2, 1909. Haseman.

Head $4-4\frac{1}{3}$, depth $1\frac{2}{7}-1\frac{1}{2}$, D. 17 or 18; A. 32-34.

Serræ 43-49.

The following specimens are probably the young of *aureus*.

5631 and 5632 C. M. Two, 22 and 29 mm. Santarem, Dec. 9, 1909. Haseman.

5697 *a-d*. C. M. Four, 19-25 mm. Santarem, Dec. 15, 1909. Haseman.

Head 3.2; depth 1.5; D. 18-21; A. 32 to 37; abdominal serræ 39 or 40 plus, three on either side of the anus; eye 2.5 in the head, about equal to interorbital, .5 in snout. Scales minute; greatest width of opercle about 2.5 in its height.

The specimens are evidently young and the proportions, especially those about the head, will probably be very different in adults.

Compressed, subrhomboidal, the profile in front of the dorsal nearly straight, the profile of the serrated portion of the belly rounded; teeth of the outer and inner series of the premaxillary close together. Origin of the dorsal equidistant from tip of snout and base of caudal, highest dorsal ray about equal to snout and eye; adipose short; depth of caudal peduncle about equal to eye; caudal slender, moderately forked; anal large, rounded, its origin equidistant from snout with the last dorsal ray; highest anal ray about equal to length of head; ventrals small, under last half of dorsal, reaching anal; pectorals still archaic.

Scales minute, largest about the pectorals. Anal naked.

Like *ocellatum*, dorsal dark at base, hyaline above the basal fourth; adipose margined with black; caudal hyaline; anal uniformly very dark. Visceral area of sides and lower part of head silvery; sides with alternating light and dark shades which become more evident forward and disappear on the caudal peduncle. In the largest the dark band down from in front of the dorsal is well marked to the visceral area; it is darkest above, just in front of the dorsal; the light band in front of this is well marked; in front of this a dark band is wedge-shaped, its posterior margin more or less parallel with the margin of the band behind it, its anterior margin is very oblique and extends to the middle of the eye, it is darker along the anterior margin and at its upper end; in front of this is another light band which curves forward above the edge to the nares, the median line of the head is also colorless; a line forward from the eye and the area between the median light space just above the eye is again very dark. Chin and ventral edge between the spines with some dark.

33. *Mylosoma albiscopis* (Cope).

5638 *a*. C. M. One, 205 mm. San Luiz de Caceres, May 22, 1904. Haseman.

- 5639 *a. C. M.* One, 92 mm. Berlin, Rio Mamoré, Sept. 15, 1909.
Haseman.
- 5640 *C. M.* One, 147 mm. San Joaquin, Bolivia, Sept. 4, 1909.
Haseman.
- ?5629 *C. M.* 44 mm. and 5630 *C. M.* Nineteen, largest 48 mm.
Villa Hays, Paraguay, April 13, 1909. Haseman.

DESCRIPTION OF ADULT.

Head 3.5-3.75; depth $1\frac{1}{4}$ - $1\frac{2}{7}$; D. 14, 15, 16, 16; A. 30, 33, 34, 37.
Abdominal serræ, 45, 49, 50.
Scales 50-86-40, supplementary scales numerous.

XI. Genus METYNNIS Cope.

34. *Metynnis guaporensis* sp. nov. (Plate LIV.)

- 5729 *a-c. C. M.* 73-99 mm. Maciél, Rio Guaporé, July 26, 1909.
Haseman.

The largest the type.

- 5730 *a. C. M.* 51 mm. San Joaquin, Bolivia, Sept. 4, 1909. Haseman.

Head 3-3.25; depth $1\frac{2}{7}$, equals body and opercle; D. 18-20; A. 41-44; serræ 29-32; eye 3.5 in head, interorbital 2.75; gill-rakers long, slender, those of the middle of the upper and longer, nearly as long as eye, 30 + 35. Scales 90.

Compressed; dorsal profile rising rapidly from the base of the occipital process to the predorsal spine; ventral profile nearly regularly arched to the anus.

Occipital process reaching four-tenths the distance from its base to the dorsal; second suborbital bordered by a naked area about equal to its own width.

Ventral spines rather strong, those behind the ventrals widened at the tip with anterior and posterior points; origin of the dorsal equidistant from snout and end of scales at base of middle of caudal; the second and third rays prolonged, 2.5 in the length, reaching about to the middle of the base of the adipose; base of adipose about equal to the postorbital portion of the head; depth of caudal peduncle equals the length of the head; caudal lobes nearly equal to length of head; distance of origin of anal from tip of snout a little less than the origin of the adipose from the same point; margin of anal nearly straight, without a lobe; origin of ventrals about equidistant from

snout with the origin of the dorsal, ventrals not reaching anal; pectorals about equal to postorbital part of head and half the eye.

Caudal naked; the minute scales of the sides extending a little way on the base of the anal:

A minute spot just above the lateral line an orbital distance from its origin.

35. **Metynnis roosevelti** sp. nov. (Plate LV.)

5738 *a-d*. C. M. Four, 90-118 mm. Santarem, Dec. 5, 6, 1909. Haseman.

The formulæ in the four specimens are:

D. 15;	A. 40;	Serræ 34
16	43	33
17	41	31
16	42	33

5739 *a-c*. C. M. Three, 62-140 mm. Bastos, June 26, 1909. Haseman.

In two specimens the formula is D. 17; A. 41; serræ 38, in the third specimen it is D. 18; A. 42; serræ 42.

5740 *a-c*. C. M. Three, 115-120 mm. Manaos. The smallest is the type.

D. 17; A. 40; serræ 33; D. 15; A. 36; serræ 34; the serræ in the third specimen number 35.

Head 4; depth 1.4, not equal to the length without the head. D. 15-18; A. 36-43; serræ 31-42; scales about 85. Interorbital 2 in the length of the head; eye 3 in the head; gill-rakers 9 + 17, longest about 2 in eye.

Profiles in front of dorsal and ventrals nearly symmetrical, there being but a faint depression over the eyes.

Occipital process extending one-third to the base of the dorsal; second suborbital bordered by a naked area equal to its own width.

Origin of dorsal equidistant from snout and end of scales at base of caudal, tip of highest ray usually not reaching adipose; base of adipose about equal to postorbital part of head and half the orbit; depth of caudal peduncle equal to eye and half the snout in the larger, but little greater than eye in the smaller; origin of anal equidistant from snout with the base of one of the posterior rays of the dorsal; distance between snout and ventrals greater than distance between snout and dorsal; ventrals not reaching anal; pectorals equal to postorbital part of head and half the eye.

Scales small; caudal naked; scales of the side extending on base of anal.

Brassy; a humeral spot almost as large as the eye. Sides in the larger with more or less obscure spots variously distributed.

36. *Metynnis hypsauchen* (Müller & Troschel).

5731 *a.* C. M. 134 mm. Manaos, Nov. 16, 1909. Haseman.

5732 *a-d.* C. M. 130-177 mm. Santarem, Dec. 15, 1909. Haseman.

5733 *a-b.* C. M. 70 and 95 mm. Manaos, Nov. 29, 1909. Haseman.

5736 *a.* C. M. 45 mm. Bastos, June 26, 1909. Haseman.

37. *Metynnis maculatus* (Kner).

5734 *a.* C. M. 84 mm. San Joaquin, Sept. 4, 1909. Haseman.

5735 *a.* C. M. 49 mm. Caceres, Paraguay basin, May 24, 1909. Haseman.

5737 *a-h.* C. M. 50-80 mm. Jauru, Paraguay basin, June 2, 1909. Haseman.

XII. Genus *MYLEUS* Müller & Troschel.

38. *Myleus pacu* Humboldt.

5749 *a.* C. M. One female, 255 mm. Manaos, Dec. 4, 1909. Haseman.

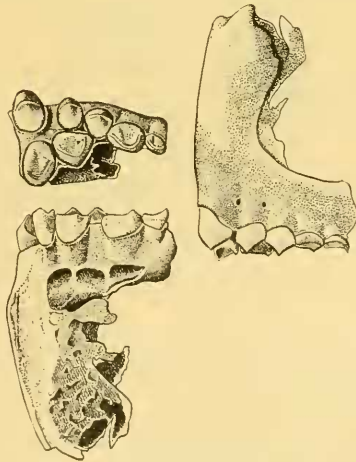


FIG. 12. Enlarged teeth of a young specimen of *Myleus pacu* Humboldt. $\frac{2}{3}$.

5750 a. C. M. One male, about 270 mm. Manaos, Dec. 4, 1909. Haseman.

5751 a. C. M. One male, 210 mm. Manaos, Nov. 17, 1909. Haseman.

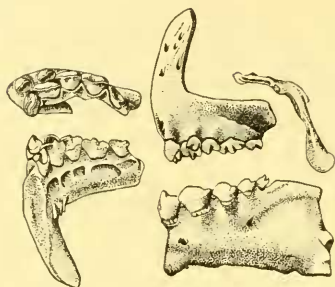


FIG. 13. Dentition of a large specimen of *Myleus pacu* Humboldt. $\frac{1}{2}$.

5752 a. C. M. One, 25 mm. Villa Bella, Oct. 5, 1909. Haseman.
Individual rays of the dorsal prolonged, filiform. Base of dorsal longer than base of anal.

XIII. Genus MYLOPLUS Gill.

39. *Myloplus micans* (Lütken).

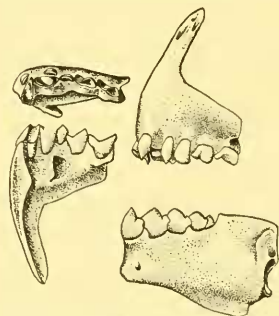


FIG. 14. Dentition of *Myloplus micans* (Lütken). $\frac{2}{3}$.

a-b. C. M. Two, 180 and 192 mm. Cidade do Barra, Dec. 6, 1907. Haseman.

5700 a. C. M. 38 mm. Santa Rita, Jan. 24, 1908. Haseman.

Head 4.33; depth $2\frac{1}{3}$ - $2\frac{2}{3}$.

D. 26; A. 37 and 38, serræ 51 and 54; interorbital 2.2 in the head.

Lips very thin, teeth partly naked, the anterior two teeth of the outer row closely pressed to the inner teeth. Intestines very large, filled with vegetable matter.

The color of the young is very similar to the color of the young of *Myleus pacu*.

40. *Myloplus rubripinnis* (Müller & Troschel).

5745 a-g. C. M. 54-87 mm. Rio Jauru, June 3, 1909. Haseman.

5746 a. C. M. 80 mm. Cachoelé de Riberao, Madeira, Oct. 18, 1909. Haseman.

D. 28; A. 35; serræ 42.

5753 a. C. M. 70 mm. Maciél, July 23, 1909. Haseman.

6534 a. C. M. 75 mm. Alcobaça, Jan. 10, 1910. Haseman.

Depth a little greater than the length of the body, counting from the end of the scales at the base of the caudal; base of dorsal about equal to the length of the anal; adipose 2.5 in the eye, second sub-orbital about equal to first; more than half the cheek naked.

41. *Myloplus schomburgki* (Jardine). (Plates LVI and LVII.)

5747 a. C. M. One, 135 mm. Manaus, Nov. 28, 1909. Haseman.

5748 a-h. C. M. Eight, ♂ and ♀, 150-200 mm. Santarem, Dec. 15, 1909. Haseman.

Depth about 1.5; head 3.5; D. 25 or 26; A. 34-36; serræ 33-36; interorbital 2-2.25 in the head; eye 2.5-2.75 in head, equal to the postorbital portion of the head.

Dorsal and anal falcate, the anal two-lobed in the male; anal lobe and dorsal lobe very narrow, adipose fin longer than its distance from the dorsal.

42. *Myloplus rhomboidalis* (Cuvier).

5754 a. C. M. One, 165 mm. Manaus, Nov. 16, 1909. Haseman.

5755 a. C. M. One, 90 mm. Cochoelé de Riberao de Rio Madeira, Oct. 18, 1909. Haseman.

These differ from specimens from Guiana in having the second suborbital longer than the first; depth less than the length without head; dorsal shorter than anal; adipose .6-1 in eye.

43. *Myloplus levis* (Eigenmann & McAtee).

5743 a. C. M. Corumbá, April 28, 1909. Haseman.

D. 31; A. 36; serræ 40. Depth less than length of body; adipose 2.5 in eye; base of dorsal greater than base of anal; anterior teeth close to posterior; first suborbital longer than second.



5742 *a. C. M.* About 150 mm. Rio Boaventura, June 16, 1909.

Haseman.

D. 29; A. 36; serræ 53.

5744 *a. C. M.* 35 mm. Caceres, May 23, 1909. Haseman.

D. 27; A. 35; serræ 41.